

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

NOTED
TECHNOLOGY DEPT.

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HUGE TIMBER ARCHES with spans of 246 ft. and heights of 170 ft., for Navy's blimp hangars, are erected by stiff-leg derricks mounted atop tall triangular towers.

NOVEMBER 1943

NAVY CONSTRUCTION by Bureau of Yards and Docks... A 12-page pictorial feature covering huge docks for lighter-than-air craft, hospitals, naval training stations, warehouses, drill halls, assembly and repair shops and advance base construction by the Seabees.

POST-WAR PLANS FOR CONSTRUCTION — By H. E. Foreman, Managing Director, Associated General Contractors of America.



Inland Steel Completes Fifty Years of Service Founded in 1893

Eight men gathered around a table in Chicago on the afternoon of October 30, 1893—fifty years ago. They were men who saw and understood the needs of the rapidly growing Prairie Empire.

They had come together to found the Inland Steel Company, to purchase a dismantled rolling mill, to place it in operation during a period of war panic and business stagnation. After months of effort the mill was started and in the first year 5,600 tons were rolled into many useful forms for steel-hungry industry and agriculture.

Years passed—some in peace and plenty, others in war or depression. Steadily the little company forged ahead in the quality and the acceptance of its products. Land soon was acquired at Indiana Harbor, where Inland constructed its first

open hearth furnaces and rolling mills. Expansion continued—blast furnaces, coke ovens, continuous mills, ore mines, coal mines, a limestone quarry, a fleet of freighters, a thoroughly equipped metallurgical laboratory—until Inland Steel Company was in full control of essential basic materials and the quality of all its many steel products. Production had climbed to 3,300,000 tons annually. Then came World War II.

Almost over night Inland, with modern mills and thousands of skilled steelmakers, turned to provide the steel to defend our country—to win against aggression. Today, fifty years after its founding, Inland is sending its entire output to men who fight. When peace comes Inland again will send steel to men who build.

INLAND STEEL COMPANY

38 South Dearborn Street

Chicago 3, Illinois

Sales Offices: Milwaukee • Detroit • St. Paul • St. Louis • Kansas City
Cincinnati • New York

CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public—Aircraft parts plant in Nebraska will be constructed by **Anaconda Copper Mining Co.**, of New York, for an estimated \$16,000,000. Contract for \$1,493,000 hospital buildings in Evansville, Ind., went to **Gust K. Newberg Construction Co.**, of Chicago, Ill., for \$1,583,700. Army contract for \$1,541,000 housing in Iowa was awarded to **Lenci, Lenci & Englund** and **H. L. Stavn**, of Montgomery, Minn. Oil refinery in New Jersey will be built by **Lummas Co.**, of New York, for an estimated \$1,500,000. **Robert E. McKee**, of El Paso, Tex., has \$1,408,000 contract for dwelling units in Texas. Low bid of \$1,432,012 for hospital in Renton, Wash., was submitted by **M. Hoard Engineering Co.**, of Seattle. **MacDonald & Kahn, Inc.**, of San Francisco, Calif., has \$1,290,700 Navy contract for building facilities in California. Prefabricated dormitory dwelling units in Texas will be built by **Texas Prefabricated House & Tent Co.**, of Dallas, for \$1,200,000. Navy contract for housing and recreational facilities in Washington, D. C., went to **Harwood-Nebel Construction Co., Inc.**, of Washington, for \$1,121,500. Housing contract in South Carolina went to **Henry C. Beck Co.**, of Atlanta, Ga., for \$1,012,700. Processing plant in Wisconsin will be built by **Klug & Smith Co.**, of Milwaukee, for more than \$1,000,000. **Walter Kidde Constructors, Inc.**, of New York, will build manufacturing plant building in New Jersey for an estimated \$1,000,000. Contract for two recreation and service centers in Pennsylvania for \$500,000 each went to **Turner Construction Co.**, of Philadelphia.

Commercial—Six hundred dwellings in Lansdowne Park, Pa., will be built by **Warner-West Corp.**, of Drexel Hill, for \$3,000,000. **Jas. T. Taylor**, of Fort Worth, Tex., will build 745 frame dwellings in Pasadena, Tex., for \$3,000,000. **P. Heratv, Inc.**, of Oakland, Calif., will build 300 residences in Oakland for \$1,500,000.

HEAVY CONSTRUCTION

Sewage disposal plant on Fisherman's Island, Toronto, Ont., will be built by **Rayner Construction Co., Ltd.**, of Leaside, for \$1,791,697. Low bid of \$1,281,419 for Alturas, Calif., airport was received from **Kuckenberg Construction Co.**, of Portland, Ore. Contract for \$1,000,000 air force installation in Oregon was awarded to **Morrison-Knudsen Co., Inc.**, and **Ford J. Twaits Co.**, of Los Angeles.

HIGHWAYS AND BRIDGES

Among recent highway contract awards are the following: Arizona: \$600,000-\$700,000 to **Basich Bros.**, of Alhambra, Calif. California: \$410,196 to **J. A. Casson Co.** and **N. M. Ball Sons**, of Hayward; and \$521,901 to **Radich & Brown**, of San Leandro. District of Columbia and Maryland: \$259,940 to **Capital Excavating Co.**, of Washington. Florida: \$386,164 to **Brinson Construction Co.**, of Tampa. Georgia: \$219,560 to **Scott Construction Co.**, of Thomasville. Indiana: \$344,522 to **Ralph Rogers & Co.**, of Bloomington. Iowa: \$203,655 to **B. L. Anderson**, of Cedar Rapids. Kansas: \$700,000 to **Northwestern Engineering Co.**, of Rapid City, S. D. Kentucky: \$254,653 to **J. C. Codell & Co.**, of Winchester. Maryland: \$494,345 to **E. W. Grannis**, of Fayetteville, N. C. Massachusetts: \$100,000-\$500,000 to **C. J. Maney Co., Inc.**, of Scitoville; and under \$1,000,000 to **John Iafolla Construction Co.**, of Dedham. Michigan: \$225,893 to **Gould & Cross**, of Grand Rapids; and \$221,636 to **Detroit Asphalt Paving Co.**, of Detroit. North Carolina: \$300,000 to **F. D. Cline**, of Raleigh. North Dakota: \$333,841 to **Northern Improvement Co.**, of Fargo. Ohio: \$200,000 to **J. C. O'Connor & Sons, Inc.**, of Fort Wayne, Ind. Pennsylvania: \$445,412 to **Central Pennsylvania Quarry, Stripping & Construction Co.**, of Hazleton; and \$225,725 to **Berlanti Construction Co., Inc.**, of Harrison, N. Y. Tennessee: \$392,541 to **H. E. Wolfe Construction Co.**, of St. Augustine, Fla. Virginia: \$240,485 to **Corson & Gruman**, of Washington, D. C. Quebec: \$420,187 to **A. Sicotte & Sons**, of Montreal; and \$248,967 to **Verocchio, Ltd.**, of Montreal.

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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NOVEMBER, 1943

The **HOW** of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

- How **BRIDGE SPANS** were raised by gantry crane to clear level of new reservoir created by TVA's Kentucky Dam. —p. 45
- How **BUREAU OF YARDS AND DOCKS** of Navy Department carried on \$2,700,000,000 construction program in 1942. —p. 48
- How **LIGHTER-THAN-AIR HANGARS** were built using wood frame dock design. —p. 49
- How **PREFABRICATED TIMBER TRUSS MEMBERS** were used in hangar construction. —p. 50
- How **ORANGE-PEEL SHAPED DOORS** of steel-frame hangars were pivoted at top of roof arch and supported by rollers. —p. 52
- How **GRAVING AND FLOATING DRYDOCKS** were built for Navy. —p. 54
- How **PRECAST CONCRETE UNITS** were used to make up rigid frame structure for heavy-duty warehouse. —p. 55
- How **SEABEES CONSTRUCT** advance bases for Navy. —p. 58
- How **PREFABRICATED TANKS** were assembled for storage of liquid fuels. —p. 59
- How **SUSPENSION BRIDGE** on Alaska Highway was built in record time to win race with ice break-up. —p. 60
- How **BRIDGE ERECTION TOWER** was mounted on skids supported on 4-ft. ice. —p. 60
- How **CELLULAR CONCRETE BLOCKS** filled with gravel formed anchorages for bridge cables. —p. 61
- How **X-RAY MACHINE** was used to test field-welded girth joints in 18-ft. dia. steel penstock pipes. —p. 64
- How **TELEPHONE CABLE** was laid underground by diesel tractor. —p. 65
- How **WELDING ROD STUBS** can be saved and welded together with home-made jig for re-use. —p. 65
- How **LANDING SHIPS FOR TANKS** were built by assembly-line methods. —p. 67
- How **SIDELINE LAUNCHING** permitted assembly of LST ships on even keel, with access to full length of hull. —p. 67
- How **TRANSFER CARRIAGES** shifted progressively assembled hull through seven building berths to river. —p. 69
- How **SYNTHETIC RUBBER OUTPUT** was multiplied by new plant construction. —p. 72
- How **COORDINATED PLANT** crushed, screened and batched concrete materials for Norfolk Dam. —p. 78

CHANGE OF ADDRESS

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Please change my address on Construction Methods

From

To

Signed

Free Enterprise

What Is It? How Does It Work?

OURS is a free enterprise economy the chief motivating forces of which are the prospective rewards for effort and risk-taking. Its smooth operation depends: first, on adequate incentives for risk-taking, innovation, and individual effort; and second, on sufficient competition to minimize the need for government regulation and to prevent artificially high prices or wages from being maintained in large segments of the economy. Trouble comes when these incentives and this competition are tampered with or removed.

America was founded by men who had the urge to better themselves and the courage to take a chance. These men uprooted themselves in Europe and braved the unknown. They risked all for freedom. They knew that, to be free, they had to attain economic freedom. Their goal was an economic freedom which permits the private ownership of property, the free choice of jobs, and free entry into entrepreneurial pursuits. Their efforts, therefore, were directed toward individual opportunity with no limit on individual achievement. Their foresight and the endeavors of those who followed them created the world's greatest industrial nation enjoying the highest standards of living.

We can take pride in the knowledge that our country has been the greatest single contributor to the world's physical assets even though we remember that an abundance of natural resources contributed materially to America's economic development. But the fact that our progress has been interrupted, again and again, by depressions which resulted in enormous wastes of our human and material resources is sobering proof that our economic mechanism still is far from perfect.

Our production per man-hour has been increasing at the rate of 2½% per year. Improved machines and greater efficiency have more than tripled the output per hour of work since 1900. Looking to the future, this annual rise indicates that our production per hour of work will double in the course of the next 25 to 30 years. This means that we can have twice our present volume of goods and services per capita or an equivalent combination of more production and more leisure. In other words, we can further increase the living standards and further decrease the working hours of the American people by further intensifying our industrial efficiency.

This is no idle dream. It can be achieved, and it will be achieved, if only we maintain the essential features of our system of individual enterprise which alone makes possible this near-utopian goal. Intensification of our efficiency, however, means that we can have full employment only if we expand enormously our production, and particularly our production of new goods. We can expand total production only if we have the markets and the demands for the vast output of goods and services made possible by our technological development. To attain these, we will need to venture into new markets, new inventions, and new methods. Such ventures involve risks, and risks will be taken only if there is sufficient prospect of reward.

Let us never lose sight of the fact that the essential features of free enterprise are the prospective rewards for risk-taking as well as for effort.

The evidence is clear that incentive methods of wage payments will boost production. Carefully devised systems of salary payment together with large differential inducements for superior performance have proved to be powerful means of raising

former standards of managerial accomplishment.

Free enterprise cannot operate effectively unless the wage and salary system offers greater rewards for greater effort. Neither can it operate effectively unless the prospects for profit are sufficient to encourage the employment of resources which otherwise would be kept idle.

Unless the prospects of profit are superior to the prospects of loss, new ventures will not be undertaken and going concerns will not expand or continue long in business. When the hope for profits wanes, employment and production slump; when that hope revives, employment and production recover.

Business initiative must be given every possible inducement in order that maximum employment may be achieved through private enterprise. This involves the removal and avoidance of restrictions on business by government, by labor, and by business itself.

Competition is the life-blood of the free enterprise system. Business and industry must rely upon efficiency rather than upon protection from competition for their survival.

Those government controls which were made necessary during the war by the magnitude of government demands for goods should be lifted at the earliest possible moment. As soon as the danger of inflation has receded, price controls must be removed and profit margins again left free to be determined by market forces. The excess profits tax must be repealed and the burden of other taxes on business profits greatly reduced. Tax laws should be revised so as to permit adequate rewards for assuming risks. The modernizing of anti-trust laws and their vigorous enforcement, not indiscriminate persecution, will be supported by all who really want free enterprise. Such measures will strengthen the incentives to expand old businesses and to start new ventures.

Grants of unlimited monopoly powers to labor unions which enable them, consciously or not, to sabotage the profit incentive in business must be withdrawn. Labor has certain legitimate rights; and in order to preserve them and its freedom, labor must come to realize that its best interests lie in a well functioning, self-disciplined competitive free-enterprise economy.

There must be evolved in the minds of business, labor, and the public a recognition of the need for private business enterprise and a realization that policies which throttle it are harmful not only to businessmen but to workers and consumers as well. Unless we achieve this understanding and avoid needless deterrents to business expansion, we are likely to pay for our folly in the destruction of our free enterprise system.

We cannot tolerate conditions in which special interest groups in business, labor, agriculture, or politics prevent free access to the market by would-be competitors. Such monopolizing of opportunities stifles progress and creates profits or wage rates based on artificial scarcity. In such cases government interference to open the market to all comers is clearly indicated. We must recognize the need for constructive policies by business, labor, and government which will insure the competition necessary for the successful operation of our economy.

Increased government regulation and control of business activities is not conducive to strengthening the virility of private enterprise. Government own-

ership and operation of productive resources certainly is not to be condoned. The more government rules and regulates business, the less will be the incentive to assume risks and to exercise individual initiative. Government regulation of the detailed operation of industry inhibits progress, is prey to political pressures, and is subject to the human failings of its administrators. *Better far the rough guidance and justice of vigorous, though somewhat imperfect, competition than the uncertainty of arbitrary regulation.*

The gravest threats to our competitive system exist in legalized monopolies, such as the N.R.A. once comprised, such as the labor unions and farm groups have recently achieved, such as businessmen themselves have sometimes sought. The power of labor monopolies to encroach on business profits will tend to interfere seriously with the needed flow of new investment. And when any group is strong enough to move the average level of costs as much as the labor groups and the farm groups are able to do, there is good reason to fear that, when we begin to approach high levels of employment and production in time of peace, these groups will induce a price-wage spiral which will waste money incomes on price increases instead of permitting them to draw unemployed resources into production. While the demands of labor for collective bargaining rights and the demands of farmers for protection against the rigors of depression have validity, there can be no reason for excessive grants of power and privilege which threaten to make our system of free enterprise unworkable.

Ours is a complex economic structure. The functions which prices, income, savings, investments, and taxes play in this system are difficult to comprehend.

As I have said before: Thinking is hard work, and we will have to work hard if we are to develop business policies, labor policies, and government policies which will insure full employment and the opportunity for consistent profit. Yet only through such policies can we guarantee that private enterprise will be the predominant source of jobs, income, and production.

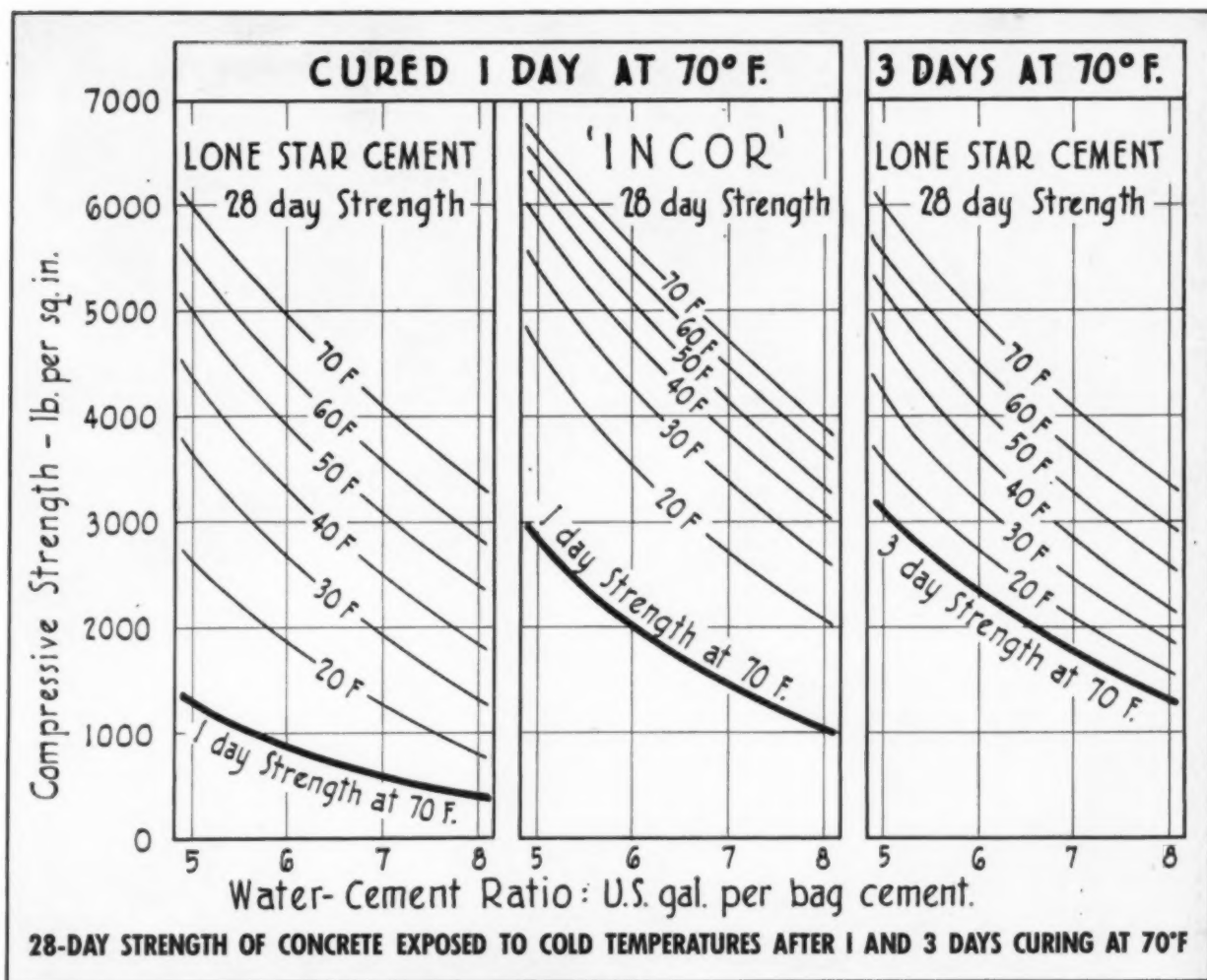
Even more difficult than thinking, and more important, is the implementation of many policies that are in the interest of the free enterprise system. Not all measures will satisfy all people. Special interests will have to be subordinated to the total interests of the nation. Sacrifice and vision have been essential to the winning of the war. They will be no less essential to the winning of the peace.

If we can gain recognition of the crucial role of incentives for enterprise, if we stand squarely for competition and against protection or privilege for special interests, and if we bend our efforts to find satisfactory ways and means to prevent large-scale unemployment, we can have the full benefits which only a free enterprise system can produce—in industrial progress, in improved standards of living, and in the preservation of our democratic ways of life.



President, McGraw-Hill Publishing Company.

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LOW temperatures retard the hardening of concrete—it must be protected against freezing and heat-cured until service strong. This graph shows the effect of cold weather on 28-day strengths of concrete cured at 70°—ONE DAY FOR 'INCOR'... 1 and 3 days for Lone Star Cement—and then exposed to winter temperatures.

'Incor' concrete, heat-cured one day, produces 28-day strengths 25% to 30% greater than Lone Star Cement concrete heat-cured 3 days. 'Incor' makes concrete safe for winter work... reduces freezing risk... saves at least 2 days' heat-curing on each pour... speeds job schedules. Save time, money, worry... keep job speed up and job costs down... use 'Incor'* 24-Hour Cement on cold-weather work.

Continuous research in Lone Star Cement Research Laboratories provides valuable performance data. We shall be glad to furnish specific information on request.

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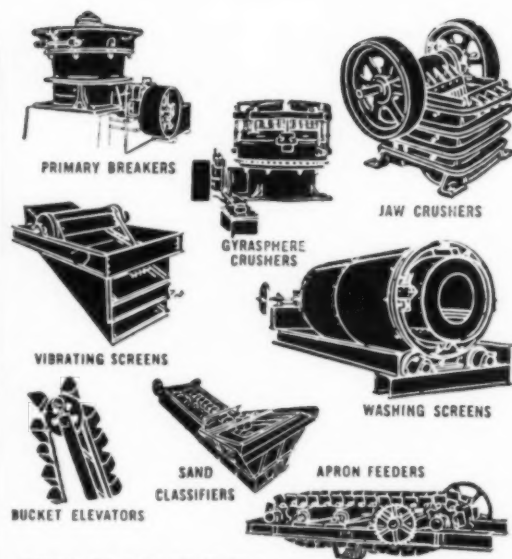
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TO ROME..."**

*and Berlin...
and Tokyo*

IT'S THE NAVY'S SEABEES serving alongside combatant forces, who are literally paving the roads to victory. Here we see them on an island in the South Seas. That may be an airplane landing strip they're building... or an access road. They're using crushed coral rock. And it's just possible it was crushed by a Telsmith Crusher. The Seabees are using a lot of Telsmith equipment and that's a fact. Most of Telsmith's output now goes to the Navy—to build Naval bases, docks, various shore structures and facilities overseas. *Get Bulletin E-10.*



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CIE-2



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● This new earth moving tool has a wide range of usefulness and can load practically any material, from loose sand to hard clay and shale, faster and in a shorter travel distance. In almost constant operation for a year and a half, the EUCLID LOADER has definitely proved its superiority over other mobile loading equipment—it is a "post war product" ready for your use on today's important earth moving jobs!

One important feature of the LOADER is its ability to make wide, level cuts and leave a smooth borrow area. The wide cutting blade with a plow point cuts through irregular surface contours and maintains maximum and steady output of material to the carrier belt for faster loading.

Send for your copy of Folder BV-400 which contains illustrations and specifications of this new type of mobile loading unit.

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CLEVELAND, OHIO

EUCLID

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For EARTH.. ROCK.. COAL.. ORE

CRAWLER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS



ASK THE SOLDIER WHO USED ONE



The Barco Portable Gasoline Hammer is taking a beating! It's taking a beating at the hands of experts... the Army Engineers, the Army Signal Corps, the Marines... around the world. We're proud to report that the Barco Hammer is not only "taking it", but it is "dishing it out" so satisfactorily that nearly our entire production is going to the armed services.

So after this war, just ask a soldier who used a Barco Portable Gasoline Hammer. Ask him about its ruggedness, its easy operation, its extreme portability! He'll give you the same straight answers we've been receiving.

Barco Manufacturing Company, Not Inc., 1812 Winnemac Ave., Chicago, Ill.

In Canada: The Holden Co., Ltd.,

BARCO PORTABLE GASOLINE HAMMERS

with Buckeye **CABLE** control

...tractors are doing more jobs!



Photo — A Buckeye Trailbuilder and Winch grading site for Army base in Tunisia.

WITH Buckeye Power Control Units and Cable Controlled Dozers, tractors are not limited to dozing work. They are the handy men of the outfit, handling 1001 jobs on fronts all over the world.

Buckeye Winches are fast; responsive. They take hold of the load smoothly with no jerk on the line . . . cable lasts longer. Center of line pull is low to keep tractor in balance.

Big clutches and brakes run cool, last longer. Single and double drum models for every tractor.

Look ahead to the benefits Buckeye Cable Control can bring you. Full data on request.

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CAN DO MORE
JOBS!

LOOK
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BUY BONDS TODAY
TO BUY BUCKEYES
TOMORROW

Buckeye✓

Tractor Equipment
Road Wideners

Power Finegraders
Trenchers

Convertible Shovels
Spreaders

...then perhaps he said to himself

A TEN-MONTH DELIVERY



MR. ROOSEVELT'S LETTER

President Roosevelt's letter to Mr. Churchill read as follows:

Dear Mr. Prime Minister:

When you were with us during the latter part of December, 1941, and the first few days of 1942, after we had become active participants in the war, plans for a division of responsibility between your country and mine became generally fixed.

Atlantic to your mills and then, in form of ships, to send them to ports for the cargo waiting to be earned.

Materials and Time

Obviously, this would be a waste of materials and time.

It was only natural to decide that this was the predominant area for our responsibility.

Here there had been developed a welding technique which enables us to construct standard merchant ships with a speed unequaled in the history of merchant shipping.

Our merchant fleet has been increased by a rapid ever-increasing rate of new ships. This is due to the fact that we have a fleet of no less than 100 ships, and you have a fleet of 100 ships.

Here in this country in abundance were the natural resources critical materials.

Here we had waiting cargoes to be moved in ships to your country and to other theatres. If our country was to have a program to move out its contemplated ship production program it would be necessary to move cargoes of raw materials to have here across the

Clearly, the great advantage was used as a waste of power. The side of the important facilities

BIG PIECE OF NEWS the Prime Minister read to the House of Commons—the 10-months' delivery of a couple hundred ships.

Again the old formula: **BIG** name in the **NEWS**... made big by Big Production... production made big by **RECOURSE TO ARC**

WELDING (remembering Webster's short definition of **RECOURSE** as "a going to for aid or protection").

So the President has written the formula into the history of the world: "Here there had been developed a welding technique... with speed unequaled."

THE LINCOLN ELECTRIC COMPANY • CLEVELAND 1, OHIO

"A Welding Technique" he said

*** * * * "with speed unequalled
in the history of merchant shipping"**

...and this, Mr. Prime Minister, is what he meant:



SHOP FABRICATION. Ships welded on a production line by assembly line methods—faster welding by positioning the welding—pre-fabrication of large sections—upside-down assembly—dozens of shortcuts make up this technique, recourse to which has revolutionized shipbuilding.

MASS PRODUCTION. If ships can be put on a mass production basis, think of the speed and economy in producing products less bulky. If speed alone were the only benefit of welding, *recourse* to it might be debatable. But consider these additional benefits:

LESS STEEL

On these 200 ships, *recourse* to arc welding saves 375,600 tons. Steel is critical. Steel costs money.

LESS HULL FRICTION

A welded Liberty ship leaving New York would reach Sicily 40 hours quicker than its rough-skinned sister of equal horsepower.

INCREASED CARGO

18% more cargo carrying capacity is provided by weight-cutting through *recourse* to arc welding.

America's greatest natural **recourse**
ARC WELDING

Tokio

PUSHING highways across the wastes of the Aleutians or other out-of-the-way places puts both tractors and trucks on the spot, and demands tops in lubrication.

To get the kind of lubrication that means high efficiency and long life, contractors more and more are using *Texaco Ursa Oil X***.

*Texaco Ursa Oil X*** keeps engines clean, rings free. It holds deposit-forming materials in suspension so that they drain away at oil-change time. It protects alloy bearings, prevents scuffing of rings, pistons, cylinders.

For quieter-running, longer-lasting transmissions and differentials use *Texaco Universal Gear Oil*.

A Texaco Lubrication Engineer is freely at your service through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

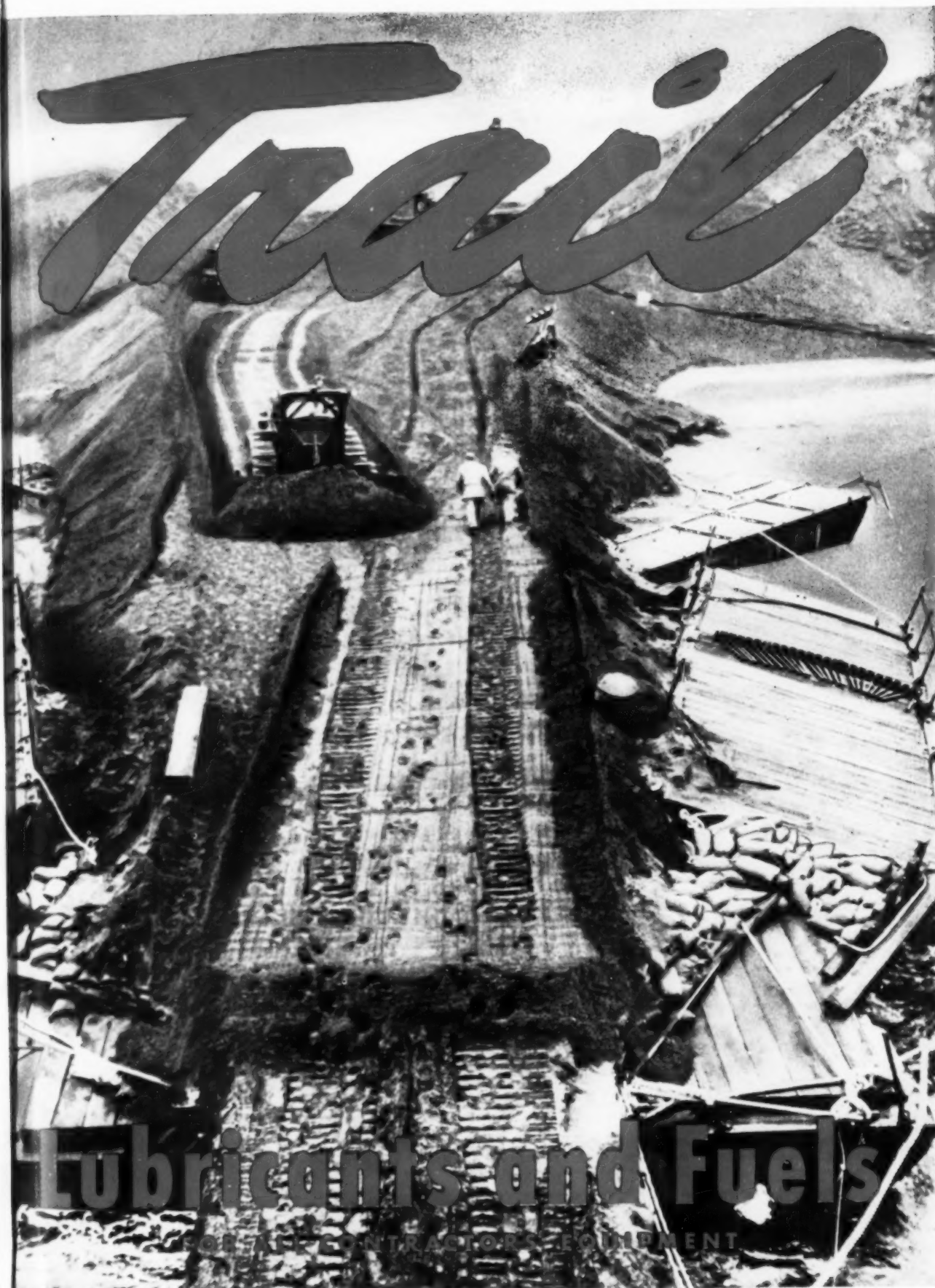
★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.



TEXACO

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY





Trail of a Saboteur

WORRIED because you can't get new tires?

Grouchy because you have to patch up old casings and nurse them along at 35 miles an hour?

Blame that fellow going over the hill ahead of you. *He's using your rubber!*

That wobbly-wheeled truck of his and others like it on construction jobs all over the country scrape and scuff away enough precious tread *every day* to keep you in new tires the rest of your life.

Wobbling wheels resulting from bent axles is one of the more obvious mechanical faults that sabotage rubber. There are scores of others—some of them rarely suspected.

Yet B. F. Goodrich has discovered how to protect you against these and most other causes of too rapid tire wear.

Through handling the complete tire maintenance programs of hundreds of truck fleets—with from 10 to 3500 vehicles each—B. F. Goodrich has developed a scientific, time-proven Tire Conservation Service that really works.

And it's available to *all* fleet owners.

Unlike ordinary tire conservation ideas, the B. F. Goodrich plan is a comprehensive, point-by-point program under which factory-trained engineers, working for you on a fee basis, give to each one of your casings the necessary personal supervision required to insure its long life and maximum service. They make suggestions to correct any mechanical and operating faults leading to premature tire failure, and in many cases make mileage stretching recommendations which result in immediate cash savings to you.

Many fleet owners who subscribed to this low-cost service cut their costs overnight. Others have reduced tire failures to as low as one in 149,863 vehicle miles! Dozens report that it saves far more than it costs!

These are tangible benefits that fleet operators like yourself are now receiving under the B. F. Goodrich Tire Conservation Service—the *first* of its kind to be offered by any rubber company.

You can have them, too. For details on how this scientific tire conservation plan can be applied to your construction equipment, write

Tire Conservation Department, The B. F. Goodrich Company, Akron, Ohio.



**To Make Sure You're
Getting Maximum Use
from Your Dozers . . .**

CHECK YOUR OPERATIONS

with this handy LeTourneau check-list

**It's Planned to Cover Your Complete Clearing & Earthmoving
Cycle . . . Shows You What to Look for at Every Operating Step**

It pays to check your equipment operating procedure regularly. If you feel that you're not getting maximum use from your tractor-Dozer rigs use this simple LeTourneau check-list. It will quickly show you where your job is falling down and what to do to correct the situation.

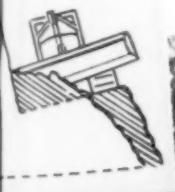
Here's More Help



To keep your tractor operators and repair crews informed on the most practical operating, service and repair practices, The LeTourneau Co-Operator is offered to you and your men FREE.

Published 10 times yearly. Read regularly by over 40,000 contractors, miners, loggers and others who operate and care for LeTourneau equipment . . . write for your copies TODAY. Just address: Dept. CM-11, R. G. LeTourneau, Inc., Peoria, Illinois.

LeTourneau Dozer building a logging skid road along a steep mountainside near Disston, Oregon. This smart operator keeps the cut low on the inside next to the bank. This keeps the tractor leaning slightly toward the bank and eliminates tendency for tractor to slip off the edge of the loose fill.



CLEARING . . . Check These Points

✓

1. Use your largest, heaviest tractors and Dozers to take out trees up to 3 feet in diameter. Here's how . . .
2. Check tree to remove dead limbs that might fall and injure operator.
3. Saucer out dirt to cut roots opposite "fall" side of tree.
4. Take a bite on either side of stump to cut and loosen roots.
5. Apply Dozer blade high up trunk for extra leverage and rock tree a few times to loosen—then push tree over and/or . . .
6. Reach blade under root ball for final push.
7. In all clearing and Dozer earthmoving operations, use LeTourneau front end Power Unit wherever possible; this leaves rear of tractor free for mounting LeTourneau 2-drum Power Control Unit to operate Carryalls, Tractor Cranes, etc.

LOADS . . . Check These Points

✓

1. Dozer bowl should always carry a heaping load.
2. Tractor motor should be working under full load by keeping up a full r.p.m.
3. Correctly set the blade—angled or straight, tilted or level—for the work.

TRAVELING . . . Check These Points

✓

1. 1½ m.p.h. travel speed—or low gear—should be used.
2. Back-up should be made in the highest gear possible.
3. Efficient haul distances should be no longer than 200 or 300 feet.
4. Doze loads in a trench or "slot" wherever possible.
5. Always doze downhill with loads. It's almost always possible.
6. Where 2 or more tractors are available—work them side-by-side to move an extra yard or two between Dozer bowls.

SPREADING . . . Check These Points

✓

1. Spread as quickly as possible.
2. Spread earth in lifts or layers as required and get rid of it quickly.
3. As soon as spread is completed, don't waste time beginning back-up or return.

MECHANICAL . . . Check These Points

✓

1. Check all adjustments on Power Control Unit and Dozer.
2. Blades should be installed with bevel edge down, and in good condition.
3. Cable must be free from binding and all sheaves running free.
4. Lubricate sheave bearings every 8 hours.
5. If rear Power Control Unit is used, right-hand drum should carry cable.

CHECK WITH YOUR DEALER—If your check-up shows a need for repairs or parts, call your LeTourneau-"Caterpillar" distributor—he's completely equipped to handle your repair job quickly, thus reduce costly down-time. Check with him NOW.

R.G. LETOURNEAU INC

Peoria, Illinois

Stockton, California

LeTourneau (Aust.) Pty. Ltd., Rydalmere, New South Wales, Australia

CONCRETE SHIPS

to Beat the Axis!



Smith-Mobile Truck Mixers Help to Speed up Vital Shipbuilding Program

When McCloskey & Co. obtained the contract for building a large number of self-propelled concrete ships, they used their fleet of Smith-Mobile Truck Mixers for mixing the thousands of yards of concrete required. Past experience on big construction projects, convinced the company that this dependable truck mixer delivers rigid specification concrete, and does it on a fast production basis.

Operators invariably insist on having Smith-Mobile's HIGH DISCHARGE feature, the FEED CHUTE charging that really works, and VISIBLE MIXING that permits inspection of the entire batch before any of the concrete is discharged. It will pay you to get the complete Smith-Mobile story. Write for Catalog 198-B.

The T. L. SMITH CO., 2251 N. 32nd St., Milwaukee 10, Wis.



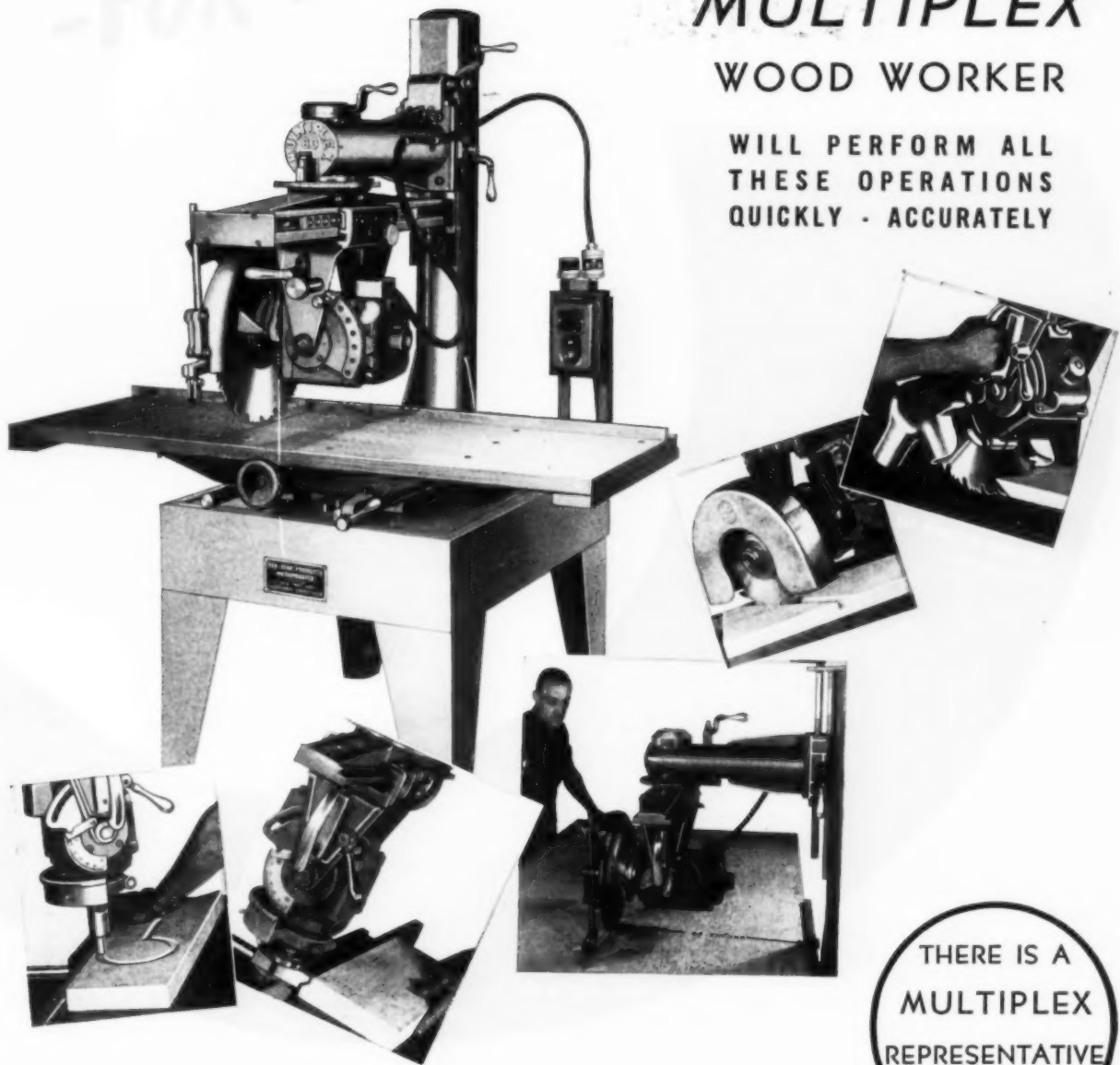
SMITH-MOBILE

The ORIGINAL HIGH DISCHARGE Truck Mixer and Agitator

FOR ODD JOBS -
FOR HEAVY PRODUCTION

A SINGLE **MULTIPLEX** WOOD WORKER

WILL PERFORM ALL
THESE OPERATIONS
QUICKLY - ACCURATELY



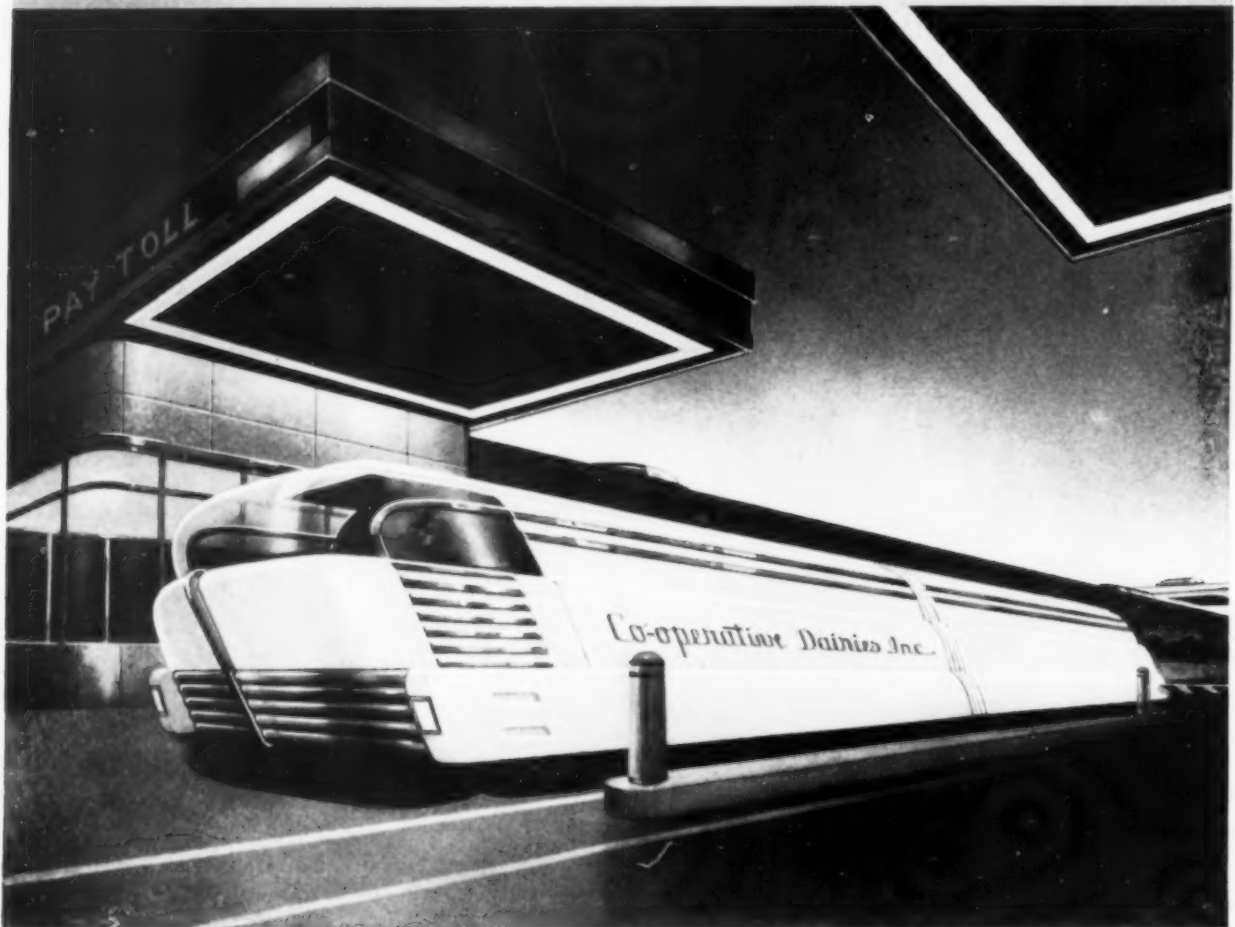
THERE IS A
MULTIPLEX
REPRESENTATIVE
NEAR YOU

Unique design of the Multiplex wood worker accounts for fast change from one operation to another and high accuracy of any cut. It replaces or re-enforces a battery of specialized machines. It is ready in an instant for small pick-up jobs or the heaviest production. There are places in every shop where the Multiplex can save hours and dollars, and do a better job.

3455 VEGA AVENUE, CLEVELAND, OHIO

2843-W

Super-Transport on Super-Highways



Sixth of a series of advertisements by The Timken-Detroit Axle Company, featuring Transport of the Future.



Metal lined, seamless, sanitary milk hauler, designed by Lurelle Guild, noted industrial designer. Maintains safe milk temperatures over long hauls, speeds delivery and lowers ton-mile costs.

After Victory, America must have super-highways designed and built to meet the needs of a great new trucking industry. Now is the time to start planning.



For Production "Well Done." You can speed Victory Day by buying United States War Bonds now!

America leads the world in the production of milk—nearly 125 billion pounds in 1942 alone. In a typical market like Philadelphia, 84.3% of all the city's milk was hauled to market by truck.

Speed, cleanliness, careful handling and economy are of major importance in milk hauling. Motor transportation meets all these requirements.

Already, forward-looking manufacturers are planning far-reaching improvements in milk trucks and trailers for the postwar world. These vehicles will use new fuels in new,

more efficient power plants. They will carry greater pay loads at lower ton-mile costs—in sanitary, insulated tanks that keep heat out and cold in.

We do not know now the exact size, shape or design of the Truck of Tomorrow that will transport milk, but we do know that axles will *carry* the load, *move* the load and *stop* the load.

That is why we are constantly on the alert for new ideas, new methods, and new materials for improving Timken products. This is your further assurance we will be ready with improved axles and brakes after Victory.

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICHIGAN
WISCONSIN AXLE DIVISION, OSHKOSH, WISCONSIN

IT'S THE OWNERS' TURN TO TALK



YOUR "Caterpillar" dealer is handling a big wartime job. He is contributing all his skill and experience, his specialized equipment and trained manpower, to the task of keeping the nation's Diesels in fighting trim. Here some typical "Caterpillar" owners tell how well he has done this job for them.

ABOUT "CATERPILLAR"
DEALERS' SERVICE,
REPLACEMENT AND
REPAIR

"OLD TWENTY-TWO" COMES THROUGH

April 26, 1943

BERGLUND TRACTOR & EQUIPMENT CO.
1224 Third St., Napa, California

GENTLEMEN: Due to my not being able to purchase a new tractor, I purchased a used "Caterpillar" Twenty-Two of comparable size from you. I am farming 200 acres of row crops which are vitally needed by my nation for food. This tractor was guaranteed and thoroughly reconditioned at the time I purchased it and to date, after about 2500 hours of operation, I have only had to make minor adjustments.

I was worried about purchasing a used tractor but my "Caterpillar" Twenty-Two has demonstrated to me that the combination of a used "Caterpillar"-built Tractor backed by Berglund Tractor & Equipment Co.'s guarantee is as good as buying a new tractor.

Very truly yours,

Eloy Gomez

FROM BONEYARD TO WAR JOB

May 13, 1943

CATERPILLAR TRACTOR CO.
Peoria, Illinois

GENTLEMEN: From the Boneyard to the Front Lines of Wartime Industry via the Connelly Machinery Company's humming Service Department went my 16-year-old "Caterpillar" Sixty Tractor to augment my fleet of "Caterpillar" Diesel D7's in day and night operations in the oil fields of Montana.

I depend upon the Connelly Machinery Company's Service Department to keep all my tractor equipment rolling and during these trying times in the rush to increase petroleum production, when it is necessary to work equipment harder and longer hours, I have learned to appreciate more than ever before the very great importance of quick, dependable service.

Yours very truly,

J. Hugo Houser

REBUILT AND HOLDING THEIR OWN

May 21, 1943

GILES AND RANSOME
17th Street and Sedgley Avenue
Philadelphia, Pennsylvania

GENTLEMEN: This is about the two old Model Seventy-Five Diesel Tractors which I purchased second-hand for a large Government contract, and which you rebuilt and modernized for us.

Since the rebuilding, these tractors have been going steadily along with our later model machines without giving us any serious trouble, which speaks pretty well for the complete rebuilding job you did.

At the time these two old models were purchased, we were somewhat doubtful as to whether they could really be rebuilt and put in shape to take the heavy punishment which they did on this job; and it was very gratifying to us to get such satisfactory service after the rebuilding.

Very truly yours,

James D. Morning

CATERPILLAR DIESEL



CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

TRAINING LESSON

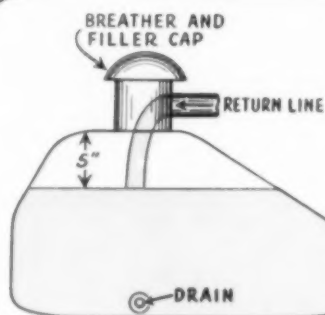
NO. 4

For New
'Dozer Operators

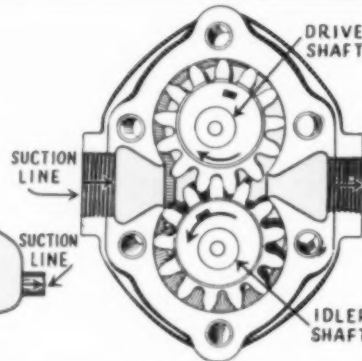
THE ABC'S OF LAPLANT-CHOATE HYDRAULICS

● SOMETIMES new 'dozer operators get the idea that hydraulic control is something mysterious and complicated. But as you "old timers" know, the principles of hydraulics, like the principles of your tractor engine, are simple as abc — once you understand them. In "Training Lesson No. 3" we gave you a simple flow chart explaining

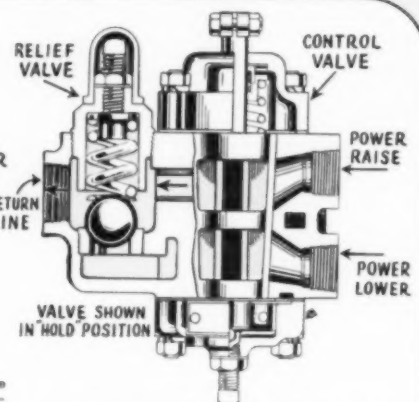
the hydraulic system used in LaPlant-Choate 'dozers. Now we are ready to show you how the four major parts of this system function — so you will know how to take better care of your machines and what to do in case minor troubles develop — as they will with any machine under today's tough operating schedules.



THE OIL TANK usually is located on the right fender beside the driver. Its function is to provide a "reservoir" for oil and also to supply an "oil head" to the suction line. The filler cap on this tank is equipped with a "breather" which automatically bleeds air from the oil lines. Oil level in the tank should be checked regularly and kept 5 INCHES (no more, no less) from the top of the tank. If oil level is too high, it may blow out the breather. If too low, air may get into the suction line, causing foamy oil and consequent loss of power.

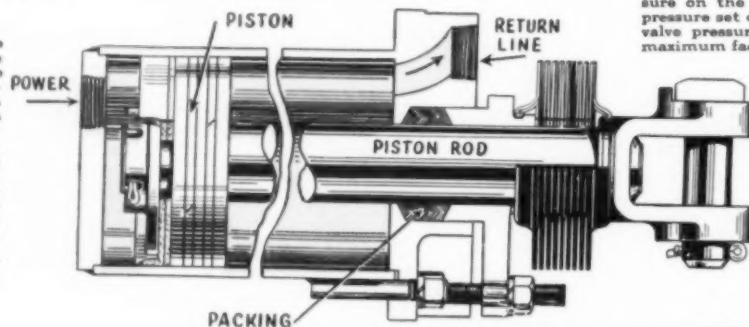


THE OIL PUMP is mounted on the front end of the crank shaft, or (in some models) on the rear transmission case. The pump has two ports, one for suction (from tank) and the other for power. It is especially important to keep the SUCTION LINE open at all times to prevent "pump starvation." The pump also has two simple gears — a drive shaft gear, which always rotates in the SAME direction as the tractor crank shaft or power take-off; and an idler shaft gear which rotates in the OPPOSITE direction. Location of the suction port is always against the rotation of the gear teeth.



THE VALVES are mounted on the oil tank assembly. The main CONTROL VALVE consists of a tapered core operating within the valve body which directs the flow of oil in three ways: (1) to either end of the jacks under pressure; (2) directly back to the tank without pressure; (3) through RELIEF VALVE to tank. The relief valve functions automatically whenever the jacks come to the end of a stroke, or when working pressure on the blade exceeds the maximum pressure set on the relief valve. This relief valve pressure should never be set above maximum factory recommendations.

THE JACKS are either mounted above the tracks, or on the engine frame, depending on model. Each jack (2) consists of a highly polished cylinder with an oil port at each end and a sealed piston to hold high pressure. As pressure oil enters one end of the jack cylinder, the piston forces the non-pressure oil out the other end causing it to re-



THE JACKS — (Continued) turn through the control valve to the tank. When pressure oil is directed to the other port, the action is reversed. Thus power is applied to the pistons in both jacks simultaneously — either forward or backward — which in turn raises or lowers the blade.

SEE YOUR LaPlant-
Choate—"Caterpillar"

DISTRIBUTOR

FOR GENUINE PARTS AND
EXPERIENCED SERVICE

LAPLANT-CHOATE
MANUFACTURING CO. Inc.

CEDAR RAPIDS, IOWA, U.S.A. - CABLE: "LAPCHOATE"

WORLD-FAMOUS TOOLS FOR EARTH-MOVING, LAND-CLEARING AND SNOW REMOVAL. BULLDOZERS, TRAILBUILDERS, "CARRIMOR" SCRAPERS, RIPPERS, TAMING ROLLERS, TREEDOZERS, BRUSH AND ROOT CUTTERS, BRUSH RAKES, STINGER BLADES, STUMP SPLITTERS, ETC. (HYDRAULIC OR CABLE CONTROLLED)

Navy 5-inch twin mount anti-aircraft gun produced
in volume by Consolidated Steel Corporation, Ltd.

For once, Radio Tokyo was almost right

The first time it happened was in the Solomons. Thirty-six Jap bombers left their base to attack one American battleship. *None* came back. Radio Tokyo whimpered that the warship evidently carried "six-inch machine guns" . . . and for once they were almost right.

For the Navy's new twin mount, five-inch gun, whipping gracefully 'round its cradle, lashes out every five seconds . . . lashes out and pulverizes, leaving no survivors and no cripples. It's more than anti-aircraft. It's aircraft *hunting*.

Consolidated Steel Corporation manufactures this weapon under contract to the Navy Department. Working to precision tolerances of 2/10,000 of an inch, volume production is today *seventeen months ahead of schedule*—a record that has won for the men and women of Consolidated every basic government industrial award.

And when tomorrow comes, when the last enemy plane is smashed, the ingenuity and skill of Consolidated Steel craftsmen will return to the fabrication of peacetime steel, seeking out, welcoming, and *handling* the "tough" jobs of postwar construction.

Consolidated Steel



FABRICATORS
ENGINEERS
CRAFTSMEN

LARGEST INDEPENDENT IN THE WEST



CONSOLIDATED STEEL CORPORATION, LTD., LOS ANGELES,
LONG BEACH, WILMINGTON, CALIFORNIA; ORANGE, TEXAS



9 Factors Affecting the Life of Wire Rope (Continued)

(This is number 18 in a series of articles prepared by Macwhyte Wire Rope Company for the benefit of wire rope users everywhere. All articles in this series are yours for the asking. Macwhyte Engineering Experience is available on specific problems.)

★ ★ ★

In the previous article of this series, the first four of nine factors affecting wire rope life or service were discussed. They were:

1. Abrasion or Wear
2. Bending or Flexing
3. Tension or Stress
4. Speed

As the article pointed out, these four can be kept from doing too much harm (to rope and machine) by frequent checkups.

While some of the four factors mentioned above are normal and to be expected, there are five other "rope saboteurs" which are not normal. These can be corrected. They are:

5. Crushing or Mashing
6. Weathering or Corrosion
7. Jerking or Shock
8. Vibration
9. Heat or Friction

What can you do to correct them, and thus save steel and time now so urgently needed? Here are specific suggestions.

Crushing or Mashing

Improper winding (criss-crossing) on the sheaves or drums results in crushing or mashing. It pays to start the rope winding properly. Keep it from criss-crossing and reduce scuffing against the flanges of the drum and against the under layer to a minimum.

Where rope is loose on the ground (on incline slopes especially) it pays to prevent trucks or equipment from running over the rope. Lubricate rollers, sheaves, and guides so as to avoid undue abrasion. When rope jumps a sheave, stop and replace it before continuing the operation.

Permanent injury to the rope and damage to equipment can result if a rope is operated while out of its proper sheaves. In clamping or fastening the end of the rope use care to avoid needless damage.

Weathering or Corrosion

Wire rope is made of high carbon steel wire and will rust and corrode if not properly protected by a suitable lubricant, especially if it is not in constant use. Proper lubrication keeps the rope flexible and reduces wear as well as affording a protection against corrosion. (See article 10 in this series.)

Jerking or Shock

If there is slack in a rope, take it up slowly before the load is applied. This is where

Not EVERY Enemy is found on the battlefield. Look...



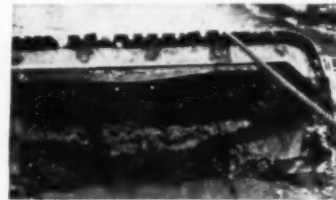
Killed through Carelessness. Literally chewed to death, this rope was ruined before showing any normal wear.



Mashed to Death. Criss-crossed on the drum, this rope gave only a fraction of the service it might have, had more care been used in spooling.



Unnecessary Abrasion. A hoist rope was allowed to saw through a heavy plate. Such waste can and should be avoided.



Why Such Waste? This rope has been cutting a number of grooves in the bucket rim. It will give poor service and increase operating costs.

the human element enters the picture. Many a rope is ruined for lack of care on the part of the operator. A quick pickup with as little as 12 inches of slack will more than double the load on the rope and may cause it to snap. Even if the rope doesn't break immediately, it is weakened and breaks later in normal operation. (See article 15.)

Vibration

Vibration of wire rope in service fatigues the steel wires and consequently "tires" them out before they wear out. It is difficult to correct this except where this vibration is caused by faulty equipment and hurried handling. A clutch or brake may chatter and this vibration is multiplied many times throughout the length of the rope. Vibration may cause rope to break where it is dead ended (fastened). Where wire rope is fastened in a socket, continuous vibration will cause the wires to break right at the socket—cutting off a short section and refastening is a cure for this. A smooth pickup and steady operation will do much to eliminate vibration.

Heat or Friction

Heat changes the structure of steel. In general, it hardens it or makes it more brittle. Friction creates heat. Lubrication

helps reduce friction. A stuck roller, a poorly aligned sheave, scuffing against wraps of rope on a drum, scraping on rock or metal creates friction and heat. Wire rope must be kept free to do its job of bending. Heat and friction will change its steel composition and cause it to break up prematurely. Where ropes travel at high speed, watch out for the effects of heat.

Your Wire Rope Requirements

The benefit of years of experience based upon servicing equipment similar to yours is gladly given. When you ask Macwhyte for suggestions and recommendations, you can be assured not only of getting "The Correct Rope for Your Equipment," but also a personal interest in helping you get the most out of your rope.

Feel free to consult with Macwhyte distributors, Mill Depots representatives, or write to Macwhyte Company direct.



MONARCH WHYTE STRAND PRE-FORMED WIRE ROPE

... Macwhyte's best grade wire rope, famous for its strength, toughness, preforming, and internal lubrication.

MACWHYTE COMPANY

WIRE ROPE MANUFACTURERS



2941 FOURTEENTH AVENUE

KENOSHA, WISCONSIN

Mill Depots: New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle • San Francisco. Distributors throughout the U.S.A.
 MACWHYTE PREformed and Internally Lubricated Wire Rope MONARCH WHYTE STRAND Wire Rope MACWHYTE Braided Wire Rope Slings
 MACWHYTE Special Traction Elevator Rope MACWHYTE Aircraft Cables and Tie-Rods

P&H

*Makes War on Wear
With Proper Care*

WHICH IS WISER:

1. To Maintain Oil Filters, or
2. Renew Bearings and Rebore Cylinders?

How long will each one take? And what's the cost?

Self-interest, as well as patriotism should prompt every owner and operator of excavating equipment to keep oil filters clean — to avoid delays on important wartime work — to prevent waste of critical time, materials and man power.

Proper maintenance of oil filters is a quick and easy matter when you follow directions outlined in P&H's newest Wartime Service Bulletin. It tells you how to service your oil filters. Your copy is ready. Write for it.

P&H Excavators reduce service problems with all-welded construction of rolled alloy steels, true rolling crawlers, hydraulic control, and many other outstanding advantages.

Write today for your free copy of Folder D-57, "Maintenance of Oil Filters for Longer Engine Life."



Another new star has been added to P&H's award for excellence in war production.

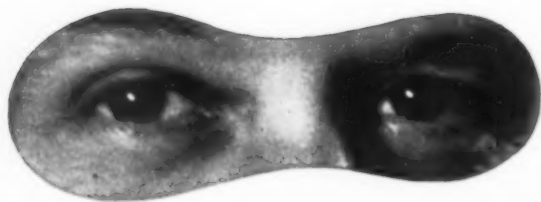
Gen. Offices: 4494 W. National Ave., Milwaukee 14, Wis.

HARNISCHFEGER
CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS



HOISTS • WELDING ELECTRODES • MOTORS



FOR SEWER ENGINEERS

WHO ARE LOOKING AHEAD

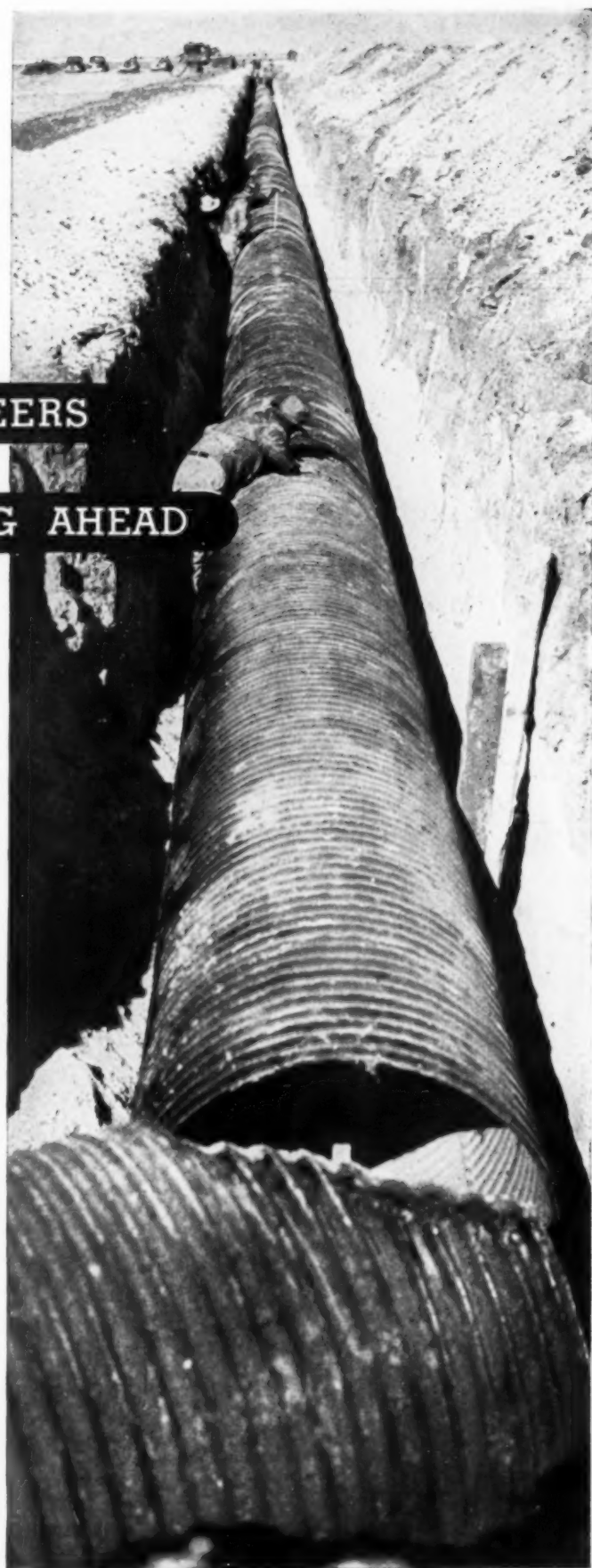
Future-thinking engineers will be interested in this airport drainage story: Engineering integrity demanded a pipe with safe strength to handle heavy loads. Since the port was to continue in use after the war, economy dictated that the system be as durable as possible. Designers solved the problem with Asbestos-Bonded Paved Pipe.

The flexible corrugated metal design of ARMCO Pipe prevents breakage; and band couplers make for strong, tight joints. Longer lengths and fewer joints mean lower installation costs. Cradling is unnecessary. Corrosion is shackled by a full bituminous coating tightly bonded to the base metal. A thick bituminous pavement checks erosion—makes the bottom last as long as the top.

It will pay you well to keep Asbestos-Bonded ARMCO Sewer Pipe in mind for post-war projects even though you may not be able to get it for immediate construction. After the war it again will be available to help solve your toughest sewer problems. Armco Drainage Products Assn., Middletown, O.



**ASBESTOS-BONDED
ARMCO SEWER PIPE**

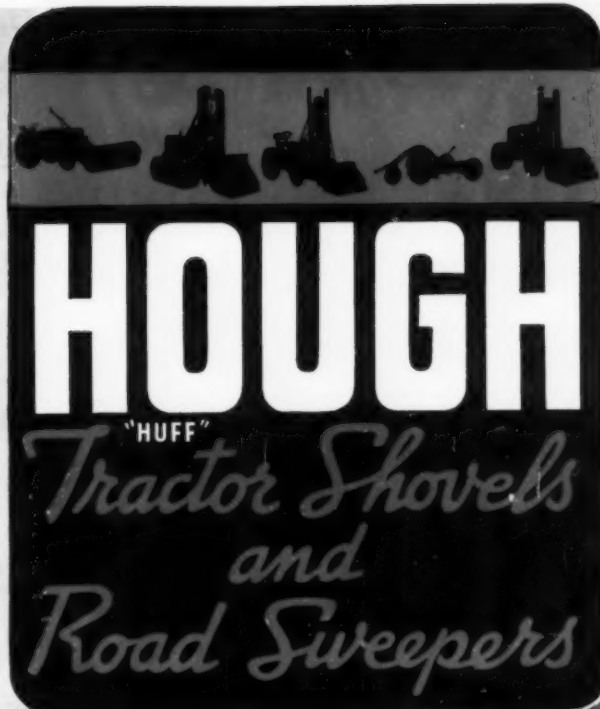


Care Every Day

Keeps the Scrap Yard Away!

Hough Shovels are scarce—even in government departments. Therefore, every care should be taken to maintain your equipment for maximum service life.

Here are suggestions: Change your oil filters every 400 hours. . . . Keep wear strips and guide frames well greased. . . Use only clean SAE 10 oil (U. S. Engineers OE10). . . . Don't forget, a noisy pump means wear—it's caused by a choked intake line. . . . Keep cable tension equalized and be sure to replace cables as soon as strands become frayed. . . . Keep cutting edges sharp for faster digging. . . . Hardface for maximum service life. . . . Use bucket teeth for digging clay and shale; wide buckets for re-handling work. Hough equipment is made to last a long time with average care and attention.



Get More Out of Your Hough

Shovels By Broader Application

Use them to load machinery parts on trucks—To set lighting standards and fire hydrants—To hoist machinery for wall and ceiling installation—To haul and dump mixed concrete into forms—For tree removal and loading—For

boosting wagon scrapers and trucks—For pulling poles, posts and shoring. They're handy, readily maneuverable and have hundreds of time-saving applications. Tractor is of course available for other operation at all times.

• THE FRANK G. HOUGH CO. Libertyville, Illinois •

**A VAST CONSTRUCTION
PROGRAM LIES BEHIND
THE ARMY'S TRAINING**



WHAT price war? The cost of war construction alone runs into billions of dollars. Turning American civilians by the millions into highly-skilled fighting forces required the construction of huge camps, for training purposes . . . quickly!

Here too as in the construction of airplane factories, armament plants and all other industrial projects of war, Lehigh Cement found an essential place. In much of this work serious delays were eliminated by the use of Lehigh Early Strength Cement, which makes concrete of service strength in $\frac{1}{3}$ to $\frac{1}{5}$ the time required by normal cement. To cite just two examples: concrete in camp roads in use within 24 hours, and superstructures of buildings started the day after concrete for foundations was placed.

The time-saving advantages of Lehigh Early Strength Cement apply, often at reduced cost, to concrete construction of all types and for all purposes—public and private.

The Lehigh Service Department will gladly answer all questions on uses of Lehigh Cements.



LEHIGH EARLY STRENGTH CEMENT for service-strength concrete in a hurry

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.



HOW AND WHY



WILLIAMS' TOOLS AID WAR PRODUCTION

DATA ON "VULCAN" EYE BOLTS



● Eye Bolts are used extensively to facilitate the moving, installation and handling of machines, equipment, gigs, etc. Many designers place Eye Bolts at strategic locations on their machines to eliminate hazardous stresses that would cause torsional weave or misalignment of critical sections or surfaces. In addition to these common industrial uses, Eye Bolts are today widely used on such war equipment as guns, tanks and boats for lifting and towing purposes. Eye Bolt failure, in addition to endangering life, may cause damage to delicate or costly mechanisms. *Strength and Safety* are therefore the fundamental essentials of Eye Bolt design.

Williams' "Vulcan" Eye Bolts are weldless, being drop-forged from a solid blank of carbon steel. After forging they are heat-treated to further increase their strength and toughness and reduce liability of breakage. Every "Vulcan" Eye Bolt is then individually proof-tested on a standard tension machine to *fifty percent beyond its rated "safe working load."* Each Eye Bolt so tested and approved is stamped with the circular identifying mark shown in the illustration at left.

The following data is intended to help users in the selection of available standard patterns and sizes. These "Vulcan" Eye Bolts can be furnished blank, from stock. Plain and Shoulder Patterns are carried in stock threaded U. S. Std., but Miscellaneous Patterns must be threaded to order.



SHOULDER PATTERN "VULCAN"

No.	Shank			Eye, Diameter		Capacity Blanks, Tons of 2000 lbs.	
	Diam., Nom- inal Rough Size; Blank	Std. Lgth. under Shldr. Blank and Thd.	Max- imum Lgth. in Stock; Blank	Inside	Outside	Safe Work- ing Load	Break- ing Strain, Approx.
21	1/4	1	3	3/4	1 3/16	2	1.5
22	5/16	1 1/8	4	7/8	1 7/16	4	2
23	3/8	1 1/4	4 1/2	1	1 21/32	7	3
24	7/16	1 3/8	4 1/2	1 3/32	1 27/32	1	4
25	1/2	1 1/2	4 1/2	1 3/16	2 1/16	1.3	5
26	9/16	1 5/8	4 1/2	1 9/32	2 9/32	1.5	6
27	5/8	1 3/4	4 1/2	1 3/8	2 1/2	2	8
28	3/4	2	5	1 1/2	2 13/16	3	12
29	7/8	2 1/4	5	1 11/16	3 1/4	3.5	16
30	1	2 1/2	5	1 13/16	3 9/16	4	20
31	1 1/8	2 3/4	5	2	4	5	23
32	1 1/4	3	6	2 3/16	4 7/16	7.5	33
34	1 1/2	3 1/2	6	2 1/2	5 3/16	9	42
35	1 3/4	3 3/4	6	2 7/8	6 1/16	11	53
36	2	4	6	3 1/4	6 7/8	13	68



PLAIN PATTERN "VULCAN"

No.	Shank			Diameter Eye		Capacity Blanks; Tons of 2000 lbs.	
	Diam.; Nom- inal Rough Size; Blank	Std. Length under Eye, Blank and Thd.	Max- imum Length in Stock; Blank	Inside	Outside	Safe Work- ing Load	Break- ing Strain, Approx.
3	3/8	1 1/4	4 1/2	1	1 21/32	7	3
4	7/16	1 3/8	4 1/2	1 3/32	1 27/32	1	4
5	1/2	1 1/2	4 1/2	1 3/16	2 1/16	1.3	5
6	9/16	1 5/8	4 1/2	1 9/32	2 9/32	1.5	6
7	5/8	1 3/4	4 1/2	1 3/8	2 1/2	2	8
8	3/4	2	5	1 1/2	2 13/16	3	12
9	7/8	2 1/4	5	1 11/16	3 1/4	3.5	16
10	1	2 1/2	5	1 13/16	3 9/16	4	20
11	1 1/8	2 3/4	5	2	4	5	23
12	1 1/4	3	6	2 3/16	4 7/16	7.5	33
14	1 1/2	3 1/2	6	2 1/2	5 3/16	9	42
15	1 3/4	3 3/4	6	2 7/8	6 1/16	11	53
16	2	4	6	3 1/4	6 7/8	13	68
17	2 1/2	5	6	4	8 9/16	16	85



TYPE A



TYPE B

MISCELLANEOUS PATTERNS

These two styles are carried in stock blank (not threaded) in the following shank dimensions:

Type A, 1/4" x 3/4" to 1-1/16" x 4-1/8"

Type B, 1/4" x 1/2" to 1" x 2-3/4"



Sold by Leading Industrial Distributors Everywhere... J. H. Williams & Co., Buffalo, N. Y.

TOOL HOLDERS



"C" CLAMPS



LATHE DOGS



WRENCHES OF ALL TYPES



PIPE TONGS



THUMB NUTS



HOIST HOOKS



EYE BOLTS





Enlarged reproduction free on request

Thanks to America's Engineers

When certain pirates started picking off what they wanted in China, Africa, Europe and the Pacific—before coming at *us*—they figured that the U.S.A. couldn't do much about it. We didn't have enough ships to handle even 30% of our *peacetime* ocean traffic! How could we interfere!

But in twenty months, thanks to your help, America has broken all shipbuilding records. Fighting production workers in mines, mills, forests . . . in factories producing essential parts . . . in oil fields . . .

and shipyards . . . have combined to accomplish the "impossible."

Continued success now depends on *maintaining* record-breaking production. The results are *beginning* to interfere with Adolph-Tojo plans. But America must not slacken its pace in producing the materials that go into the building and the operating of our Merchant Marine—the metals, timber, coal and oil, the marine equipment, and cargo for the ships.

Now it is up to all Americans to *finish* the job . . . and *fast*.

You Have Helped Us Do Our Part

We thank you, loyal customer, for conserving Wickwire Rope so that more can go to the Liberty Ships. But when you need new wire rope to maintain war production, tough, long-lived Wickwire Rope will always be available on priority, to the best of our ability.

Wickwire Spencer was first in New England to be awarded the Maritime M and Victory Fleet Flags for excellence in production of rigging for the U. S. Merchant Marine. A Gold Star has been added for maintaining that record.



Copyright 1943, Wickwire Spencer Steel Company, 500 Fifth Avenue, New York 18, N. Y.



WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City



10 SHIPS IN 11 DAYS

FORECAST

*THINGS
TO COME*

Recent launching of 10 ships in 11 days by the California Shipbuilding Corporation adds extra emphasis to forecasts of steadily increasing activity on all war fronts. And very much "on the job" in the continued record-breaking construction of Liberty ships at Calship is a fleet of 13 General Supercranes.

Mobility of General equipment . . . fast, accurate handling of all types of materials assured by Supercranes . . . conservation of manpower and fuel (General Supercranes are operated by one man, powered by one engine) *forecast important "things to come"* in post-war materials handling. At that time, you can again count on General Supercranes for your toughest, most exacting jobs just as today they are being called on to meet all the grueling demands of global war.



The
OSGOOD
COMPANY

Sizes: $\frac{1}{2}$ to $2\frac{1}{2}$ Cu. Yd.
Diesel - Oil - Gas - Electric

Associated with
The GENERAL
EXCAVATOR CO.

The
HERCULES
COMPANY

HERCULES
IRONEROLLERS
6 to 12 Tons
Diesel or Gasoline

Associated with
The GENERAL
EXCAVATOR CO.

GENERAL

Sizes:
 $\frac{3}{8}$ - $\frac{1}{2}$ - $\frac{3}{4}$ - $1\frac{1}{4}$ Cu. Yd.
Diesel - Gas - Electric

SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted

THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

WRITING A NEW CHAPTER IN TRANSPORTATION



A new era of bygone days was represented by the "American Express Train" of 1855, here pictured by the famous lithographer, Nathaniel Currier. In 1869, that era culminated in the completion of the first transcontinental railroad.

Railroads are facing their biggest test in moving today's record volume of freight. GM Diesel freight locomotives are helping the Seaboard to do its part in meeting this emergency.

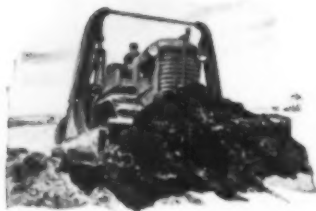
The war record of the railroads is a remarkable story of transportation.

And potent new factors in writing this story are General Motors Diesel Locomotives.

Tough, tireless freight Diesels are hauling war loads faster, and with rare economy of precious fuel.

They are adding a new chapter to

America's story of railroading, and demonstrating that today's achievements are the first great step in a new era of transportation.



Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.



LOCOMOTIVES.....ELECTRO-MOTIVE DIVISION, La Grange, Ill.

ENGINES...150 to 2000 H.P....CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

ENGINES.....15 to 250 H.P.....DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

★
**BACK THE ATTACK—
WITH WAR BONDS**

How ONE Contractor Paved 240 MILES of Runway Slab AT WAR SPEED

*RUNS OF 300 LIN. FT. PER HR. OF 25 FT. WIDTH
(9"-7"-9") WERE COMMON



USED TWO 34E DUAL DRUM
PAVERS WITH ONE JAEGER TEAM



THE RECORD: In the first 18 months since Pearl Harbor, Koss Construction Co., Des Moines, Ia., completed 13 contracts for over 3,500,000 sq. yds. of concrete airport paving (more than 240 miles of 25 ft. slab)—all poured with 34E dual drum pavers followed by Jaeger Paving Teams (25 ft. Screw Spreader and Type "H" Finisher).

Two of these big pavers were often used with only one Jaeger Spreader-Finisher Team.

THE REPORT: Mr. Richard Koss states: "At no time has this Jaeger equipment failed to keep up with the production of two pavers and this includes all types of weather from the very hottest days to the coldest winter days that we poured concrete . . . In spite of the large amount of yardage laid, the machines are still in excellent shape."

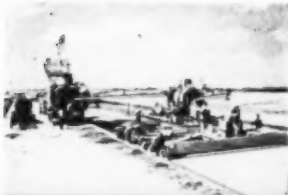
THE VERDICT: For today's—and tomorrow's—paving needs (steady, high production with small crews) use the Mechanized Paving Team, originated by Jaeger.

THE JAEGER MACHINE COMPANY

800 Dublin Ave., Columbus 16, Ohio

ALSO MIXERS—PUMPS—HOISTS—TRUCK MIXERS

VIBRATORY MIXES
EASILY HANDLED



JAEGER

SCREW CONCRETE SPREADER
TYPE "H" FINISHING MACHINE

the PUMPS that EXCEED their PROMISES



JAEGER

"SURE-PRIME"



Portable
3000 Gallon
"Bantam"



Above: 3" Heavy
Duty Model

Right: 10" Port-
able Pump

All sizes 1 1/2" to
10"—Gas, Elec-
tric, Diesel

Also Jetting
Pumps



Patented "Prim-
ing Jet"

Self-Cleaning
Shells

Replaceable
Liners

Longest Life
Seal

Oversize Shafts

for Years the **ONLY**
Pumps that have been
Factory-Tested and
Certified and Regularly
Exceed Their Guarantee

- with up to 5 times faster, 100% automatic priming,
- with high air and water capacity under adverse conditions,
- with thousands of extra hours of trouble-free service.

ON SALVAGE WORK AT PEARL HARBOR (where Jaeger 10" Pumps of 40,000,000 gallons daily capacity worked constantly for 10 months) and thousands of other war jobs at home and abroad, Jaeger Pumps are "going places" for you and Uncle Sam. Your Jaeger dealer has them for sale or rent.

Repair Parts and Quick Service in Over 100 Cities

THE JAEGER MACHINE COMPANY

800 Dublin Avenue, Columbus 16, Ohio



The women

They know that this is war, and that the price of victory will be high. They have sent off their sons, brothers and husbands to the armed forces, and they are coming out of beauty shops and offices, stores and homes, and are taking war jobs in steel mills and shipyards. The deft hands that in peacetime wielded the skillet and the dryer are now managing the boring mill and the welding torch—and to very good effect.

Ever try keeping traffic flowing smoothly in and out of the main entrance of a big steel plant? Ever knock a "hot top" off an ingot? Or rough-bore a gun forging? Or weld a ship's hull? Not women's work? Women are every day doing these and dozens of other jobs in Bethlehem shipyards and steel plants, and doing them superbly.

At Bethlehem and Lackawanna, at Baltimore, at Fore River and Hingham, on the Pacific Coast—and at other locations where this company operates plants and shipyards—former clerks and beauty-shop operators, sales-girls and housewives, are applying themselves to their new, challenging tasks with wonderful spirit and skill. They are helping to swell the mighty output of steel and ships and ordnance. The results of their efforts are being painfully felt in Tokyo and Berlin. Hats off to them!



Woman "patrolman" at a Bethlehem steel plant. Here is a job calling for plenty of tact and skill! Women are serving on patrol duty at gates, parking lots, offices, and other locations with efficiency and aplomb.



Once a dancer, now she runs a machine in a Bethlehem shipyard.

This "buggy" operator is hauling naval shells in a Bethlehem plant.

Upswept hairdo, red finger-nails, don't keep this girl welder from doing a man-size job at a Bethlehem shipyard

Buckets need Care ..

Of all mechanical tools the clam-shell bucket gets more banging around than any other tool used by construction men.

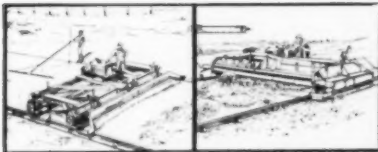
It is called upon to work under the toughest conditions, and to do jobs for which it was not intended.

Just a little attention and timely repairs — and your bucket will last its allotted life span.

How to care for buckets

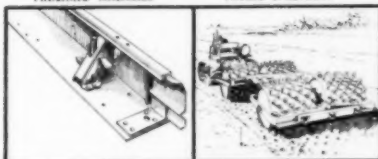
is completely described and illustrated in Blaw-Knox's Bulletin No. 1930, which is all ready to be mailed upon receipt of your request.

Blaw-Knox Construction Equipment is doing a Vital War Job



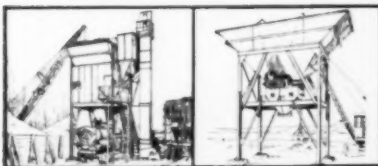
AIRPORT FINISHING MACHINES

AIRPORT PAVING SPREADERS



AIRPORT PAVING FORMS

TAMPING ROLLERS



TRUCK MIXER LOADING PLANTS

AGGREGATE BATCHING PLANTS



CONCRETE BUCKETS

BULK CEMENT PLANTS



BUY U. S. WAR BONDS AND STAMPS

BUCKETS ARE War WEAPONS

...keep yours on the job!
...follow Blaw-Knox instructions

...this book tells you how

BLAW-KNOX DIVISION of Blaw-Knox Company
2086 Farmers Bank Bldg. Pittsburgh, Pa.

☐ Send a copy of Bulletin 1930—"Maintenance and Care of Clamshell Buckets"

...The Serial Numbers of my Blaw-Knox

Buckets are: _____

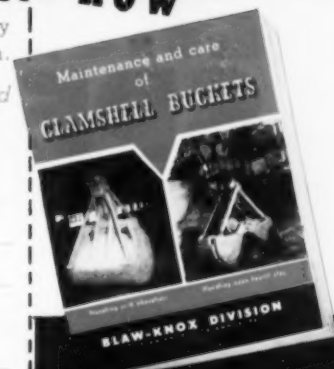
Company _____

Individual _____

Address _____

City _____

State _____



LINK-BELT SPEEDERS ARE HELPING TO BUILD THE ALASKA HIGHWAY!



Wherever there's a real job of road building to be done—one that requires extra strength and stamina—there the wise contractor turns to a Link-Belt Speeder. Size for size no other machine can equal the powerfully built, skillfully engineered Link-Belt Speeder for power and capacity! They require a very minimum of maintenance—are easy to handle (finger-tip control)—relieve the operator of unnecessary fatigue on the job. There is a size and type Link-Belt Speeder for every job.

BACK THE ATTACK

—BUY MORE BONDS!

LINK-BELT SPEEDER

BUILDERS OF THE MOST COMPLETE LINE OF

SHOVELS-

CRANES-

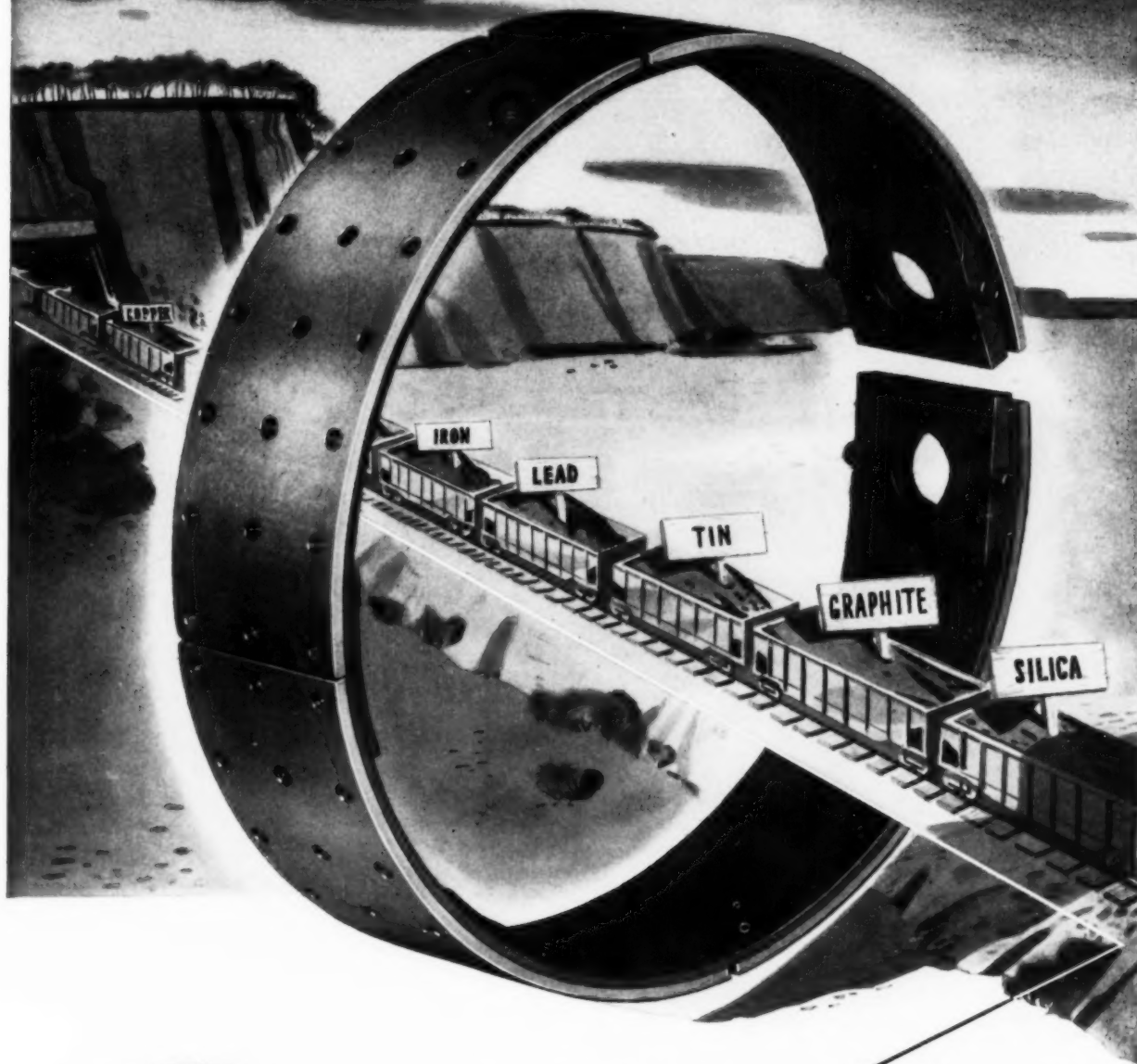
DRAGLINES



LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO, ILL.
(A DIVISION OF LINK-BELT COMPANY)

Velvetouch

BIMETALLIC FRICTION MATERIAL



VELVETOUCH is available in a wide variety of constructions for every industrial application.

A scientific combination of
POWDERED METALS
for brakes and clutches

THE S. K. WELLMAN CO.

1374 East 51st St., Cleveland, Ohio

*Pioneers in putting Powder Metallurgy
to work for Industry*



SKYLINES
the world around
could tell of
Thermoid

Symbol of steady growth in engineering genius, the modern skyline also attests the brawn of men and strength of materials that can conquer really *tough* jobs.

While contractors in many fields have come to "rely on Thermoid" as a matter of course, we are proud that Thermoid Products are *specified* to help solve so many *outstanding* construction problems.

Thermoid Hose (air, water, suction and steam),

THE THERMOID LINE INCLUDES: Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products.

Thermoid Conveyor Belting, Industrial Brake Linings and other products are *designed* by engineers who *know* what unusual services they may be called upon to perform . . . and *built* by technicians whose only thought is to *assure* that extra performance on your work.

It's good business to do business with Thermoid.

Thermoid
Rubber

DIVISION OF THERMOID CO.
TRENTON 6, NEW JERSEY

Don't put it off 'til tomorrow . . . BUY MORE WAR BONDS TODAY!

Pushing a Bulldozer
is his
Battle Station...



OURS is giving him better WIRE ROPE!



It's NOT ALWAYS easy to see the tie-up between cleaning up a rock cut—and blasting the enemy. But, look at the fronts where construction is fighting and there's nothing remote about it. Yours is a front line industry... as necessary in getting armament built as in pushing it through to battle.

And our job of keeping you supplied with a tough, easy-to-handle wire rope like "Blue Center" is no less vital. First choice with outstanding contractors throughout the country, you'll find it resists the loads

and shocks of a midget scraper or the largest shovel ever made... withstands the crushing and abrasion of high speed operation... gets full capacity from men and equipment through easier handling, fewer shut-downs, more sustained operation.

☆☆☆

Yes, Roebling "Blue Center" Steel Wire Rope is conserving steel for all America... by staying on the job longer... by meeting emergency service conditions unfailingly, wherever wire rope has a job to do, for Victory.



GIVE YOUR WIRE ROPES A FIGHTING CHANCE...

and they will deliver the full length of service that has been built into them. To help you, Roebling has assembled a wealth of conservation data that can be fastened right to the equipment. Printed in two colors and varnished to stay clean, it's a convenient way to remind and instruct operating men about such vital precautions as: Proper Installation, Correct Spooling, Proper Use of Clips,

Regular Lubrication, Frequent Inspection and Careful Operation. Copies are yours for the asking. Write our nearest office and specify Tag "A".

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

MAKE ONE BEARING OUTLIVE TWO!



One plant that regularly had two or three bearing failures a month writes us, "We have had only one bearing failure in five years since using LUBRIPLATE"... another writes, "Pulled our ball bearing temperatures down from 170° to 130°F"... still another, "If LUBRIPLATE cost \$1.50 a pound we could still afford to use it."

BALL BEARING LUBRIPLATE

Over a period of years this outstanding grease type lubricant has reflected superior performance on the general run of ball and roller bearings operating under normal conditions at speeds up to 5,000 R. P. M. and temperatures from zero to 300 degrees F.

Long time users of BALL BEARING LUBRIPLATE everywhere attest to its superiority in providing cool and quiet operation—protection against corrosion, and of major importance, substantial reduction in bearing replacement costs.

Write today for your copy of Bulletin No. 1-43 containing valuable data on the lubrication and care of anti-friction bearings.

LUBRIPLATE DIVISION
FISKE BROTHERS REFINING COMPANY
 Newark, N. J. **SINCE 1870** Toledo, Ohio
 DEALERS FROM COAST TO COAST

7 FACTS ABOUT LUBRIPLATE

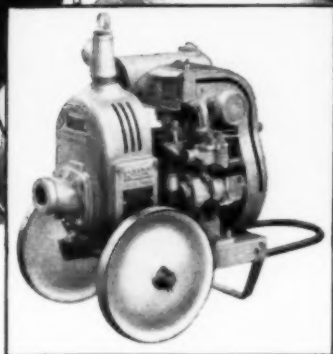
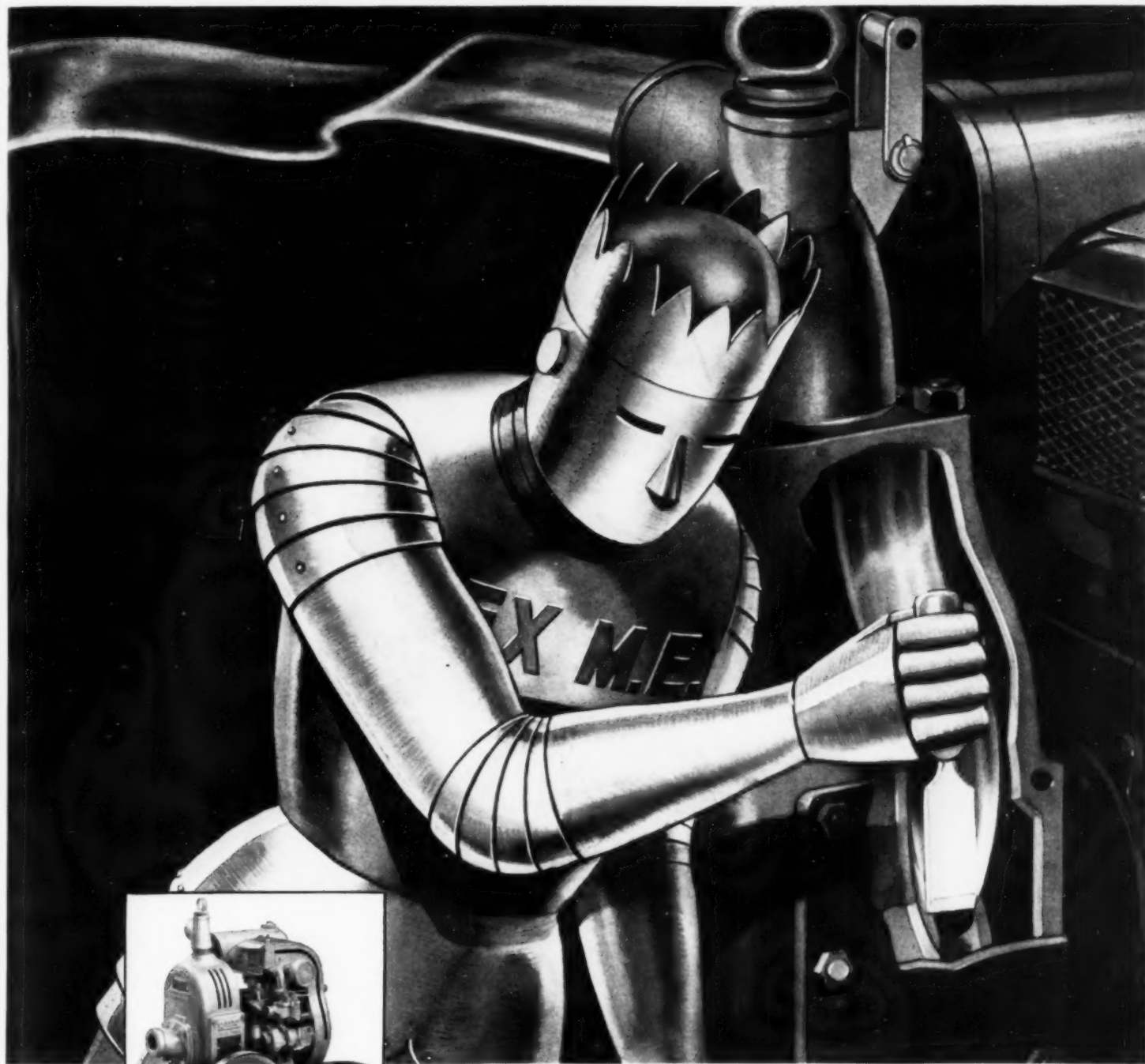
1. LUBRIPLATE produces an ultra-smooth, wear-resisting bearing surface.
2. LUBRIPLATE reduces friction, thus lowering maintenance and power costs.
3. LUBRIPLATE resists rust, corrosion and pitting.
4. Most LUBRIPLATE products are white, LUBRIPLATE assures clean lubrication.
5. LUBRIPLATE outlasts ordinary lubricants many times.
6. LUBRIPLATE is economical—a little goes a long way.
7. LUBRIPLATE is available in fluid and grease types for every need.



LUBRIPLATE

THE MODERN LUBRICANT that Arrests Progressive wear

"It's the Film"



He peels AIR to pump WATER

REX Mechanical Engineering—REX M. E.
—is constantly developing in his research laboratories and proving in the field, ideas that enable Rex products to achieve maximum results at minimum cost and waste.

A famous example is the Air Peeler. It grew from an inspired *idea* into a sharp-edged blade of Z-Metal that peels a thin stream of *air* from the impeller of Rex Speed Prime Pumps when priming.

This Air Peeler gives Rex Speed Prime Pumps greater priming efficiency—enables them to deliver a greater volume of water in the face of suction line leaks that might stop ordinary pumps.

According to Rex M. E., the Air Peeler helps Rex

Speed Prime Pumps deliver *all* the volume *all* the time.

Rex Speed Prime Pumps have capacities from 3000 G.P.H. to 125,000 G.P.H. Each of these pumps, and the many new engineering *ideas* which give them added efficiency, is described in a factual, well-illustrated catalog. Write for it to Chain Belt Company, 1664 West Bruce Street, Milwaukee 4, Wisconsin.



**CONSTRUCTION
MACHINERY**

Concrete Mixers • Moto-Mixers • Pumpcretes • Pavers
Mortar and Plaster Mixers • Speed Prime Pumps

CHAIN BELT COMPANY OF MILWAUKEE



Dear Mom:
I'm among old friends way
over here ~ today a B-G plant
+ I helped assemble when
Barber-Greene!
her

We have had to learn to walk and to save fuel and stop over-eating. Prices are going up with taxes. We at home — among familiar scenes and faces—are having it "tough."

But Harry, our office boy, wrote of the thrill he got meeting a Barber-Greene Ditcher as he marched into Bizerte. He, and 126 other Barber-Greeners in Service write us with nostalgia of meeting Barber-Greene machines on foreign soil. To them, those pounding, unlovely masses of welded steel represent HOME. To them, in Africa, Sicily,

the South Pacific, Alaska, Greenland, Iceland, those machines working in burning sands, coral atolls, or frozen tundra are the one familiar sight. Home!

Those in service inspire us—as they must all producers of war goods — to "E" production and "Star" production. As we get more and more of these reminders of home — American construction equipment,—out of the plants to the front, we will hasten that day when home is really home, and not just a memory inspired by a mass of steel at Bizerte, Berlin or Tokyo.

43-4

BARBER-GREENE
AURORA, ILL.

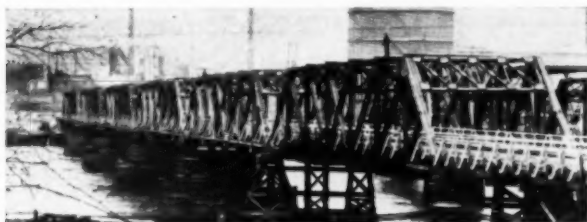
STRENGTH IS IMPORTANT



... BUILD WITH TIMBER STRUCTURES



PORTLAND. Steel warehouse for Woodbury & Co. The roof of this 200'x300' building is supported by 35-67' trusses, 15 lb. dead load, 40 lb. live load, plus 14,000 lb. concentration at center line of bottom chord and adjacent to each end of the truss. Concentration supports a three-point suspended traveling crane. Architect: Richard Sundeleaf. Contractor: Wegman & Son.



PITTSBURGH. Fleming Park Bridge—756' (six 126' spans) was built for 12-ton trucks and 30-ton street cars. Designed by Allegheny County, Pennsylvania. Detailed, prefabricated by Timber Structures, Inc. Erected by J. F. Casey Co., Inc. and McCrady Construction Co., Aspinwall, Pa. Verne Ketchum, Engineer for Timber Structures, Inc.

CLEVELAND. 200' laminated trusses were designed, prefabricated and erected by Timber Structures, Inc. for 200'x440' assembly plant, for The U.S. Engineers. Front trusses, (supporting doors and roof), were built to carry 450,000 lbs. Intermediate trusses built to carry 310,000 lbs.

ROOF TRUSSES and other items prefabricated by Timber Structures, Inc. embody the natural strength of wood plus connection strength of modern timber connectors. So strong, in fact, are laminated timber members, that they are being used in structures where previously only steel girders were considered practical.

Strength is important, yet it is but one of the features of Timber Structures products. Other advantages are ready source of materials, speed of construction, economy and permanence.

This organization has rendered years of service to contractors, architects, engineers, plant management in prefabricating roof trusses for buildings of all kinds and sizes for every major industry. We invite inquiries as to work performed and as to our ability to serve you in timber or other structural materials. For evidence of work we have done please use the coupon below or write direct for literature.



Use of Teco timber connectors utilizes full structural strength of lumber by spreading joint stress over maximum area.

**TIMBER
STRUCTURES**
INCORPORATED

Portland 8, Oregon • New York 17, N.Y.

Engineering in Wood

TIMBER STRUCTURES, Inc.
Send Book "Engineering in Wood"

Name _____

Address _____

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If west of the Mississippi, send to Portland 8, Oregon. If east of the Mississippi, send to 535 Fifth Avenue, New York 17, N. Y.

MAIL
COUPON FOR
LITERATURE

**Engineers and
Contractors Agree**

.... MONOTUBES' *Speedy Extension*

CUTS TIME and COSTS

ONE of the features of Union Metal's all-steel tapered Monotubes which foundation engineers and contractors like best is their speedy and easy extension. Extendible Monotubes permit the installation of varying pile lengths without delay or waste—even in low headroom.

Other outstanding Monotube features are:

SPEEDY DRIVING—Monotubes are so strong and rigid they require no heavy core or mandrel and can be driven with average job equipment.

SPEEDY HANDLING—Monotube steel casings are light in weight, can be handled quickly and economically.

SPEEDY INSPECTION—The hollow tubular design of Monotubes enables you to inspect these casings quickly and thoroughly from top to toe prior to concreting.

Monotubes are available in a wide range of gauges, sizes, and tapers to meet exacting requirements in varying soil conditions.

**THE
UNION METAL
MANUFACTURING COMPANY**
Canton, Ohio

Buying as many war bonds as you can afford isn't enough! Buy more than you can afford. Buy war bonds and stamps with every cent you can lay your hands on. For then, and only then, can you face our returning soldiers with a clear conscience.





LIMA

A good name to remember
when planning your
future excavator needs

When you are thinking in terms of cranes, shovels and draglines it is smart to think of LIMA.

LIMA cranes, shovels and draglines are built in sizes ranging from $\frac{3}{4}$ cubic yards to $3\frac{1}{2}$ cubic yards capacity. They are of compact design, perfectly balanced and easy to operate with a wide range of adaptability.

LIMA cranes, shovels and draglines provide reliable performance at low cost on any earth moving or material handling job.

Include a LIMA in your plans for the future. Write for bulletins.

**LIMA LOCOMOTIVE WORKS,
INCORPORATED**

Shovel and Crane Division LIMA, OHIO
NEW YORK, N. Y. PHILADELPHIA, PA. MEMPHIS, TENN. ST. LOUIS, MO.
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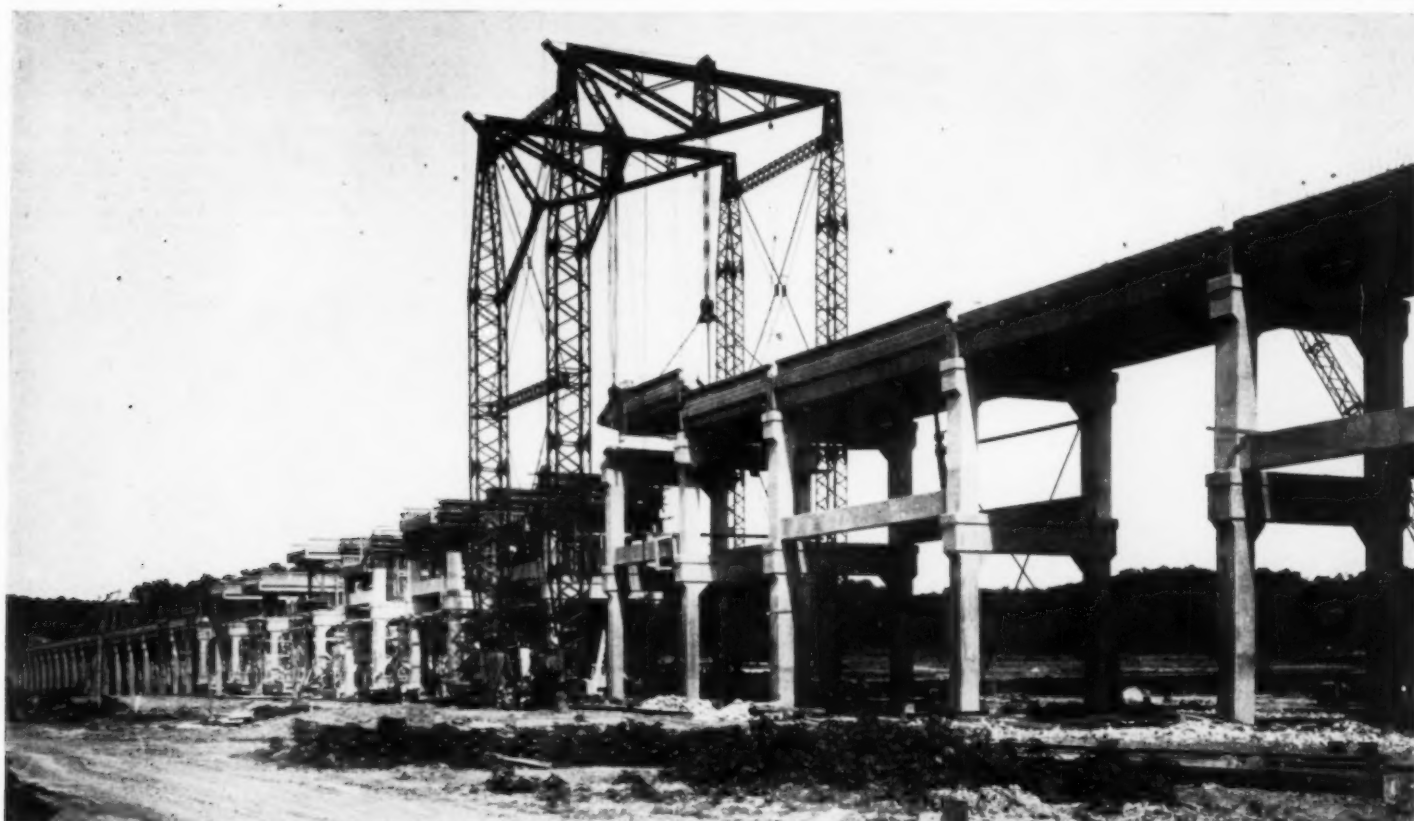
Construction Methods

ROBERT K. TOMLIN, Editor

Volume 24

NOVEMBER, 1943

Number 11



TOWERING GANTRY CRANE, equipped with two 100-ton hoists, lifts one of approach spans of mile-long bridge in area to be flooded by TVA's Kentucky Dam.

PRIOR TO FILLING THE RESERVOIR created by the construction of the Tennessee Valley Authority's Kentucky Dam, the Scott-Fitzhugh bridge on Tennessee State highway 76 had to be raised to provide the required navigation clearances and minimum freeboard above surcharge pool. The bridge, slightly less than 1 mi. long and with a 20-ft. roadway, consisted of 11 through-truss spans and 69 approach viaduct spans, of which 56 were on the east side and 13 on the west side. The truss spans were raised varying amounts up to 16 ft. 6 in., and the viaduct spans were raised amounts up to 18 ft. 6 in.

The existing west viaduct spans were raised and supported on 12-ft.-high rigid-frame extensions to the existing concrete bents. The existing columns at the ground surface were reinforced by the installation of a new transverse strut.

A portion of the east viaduct remains unchanged, but from bent 17 eastward, the approach spans were raised varying amounts. Bent 17 was extended with

Bridge Spans Raised By Gantry Crane To Clear New Reservoir Level

shim plates. Bents 18 to 22, inclusive, were extended with a solid section on the existing cap. The caps of bents 23 to 34 inclusive were cut off and new extensions were constructed to eliminate the old vertical curve. The remaining spans in the east viaduct were extended with rigid-frame towers above the adjusted existing caps.

Two new 28-ft. 6-in. spans and a new box-type abutment were added at the east end, and one new 43-ft. T-beam span was added at the west end of the bridge and supported on a new box-type abutment. The overflow bridges were not required for waterway and were demolished and replaced with embankment sections.

The viaducts of this bridge were ideal for using a gantry crane, equipped with two 100-ton hoists, in raising the spans. Most of the spans were set on temporary steel bents while the concrete extensions were being constructed, and the bents were reused as the work progressed. A

(Continued on page 140)



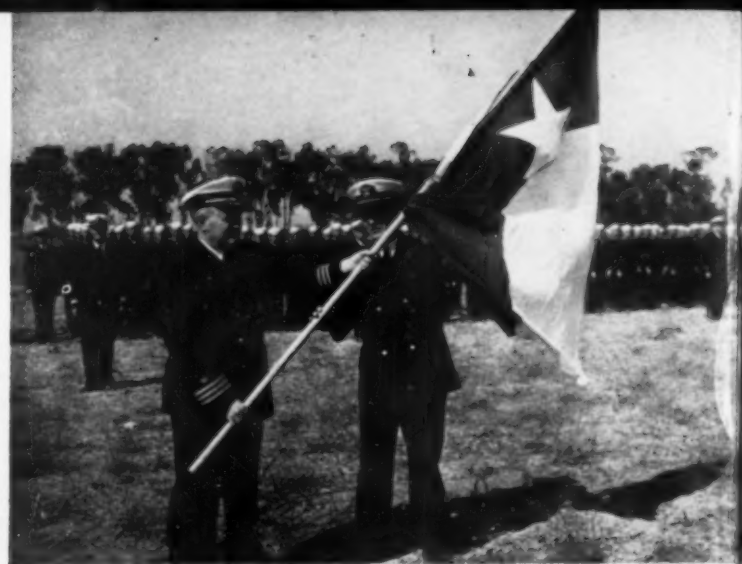
LIBERTY SHIP is rushed to completion by assembly line methods, as cranes lift preassembled deck house and navigation bridge into position at California Shipbuilding Yards in Los Angeles.

Armo Photo

THIS MONTH'S NEWS REEL

Page 46

DESTROYER ESCORT VESSEL (below) is side-launched into Ohio River from Neville Island shipyard of Dravo Corp., first such fighting ship to be launched so far from salt water. It was built by assembly line methods. Launching was feature of ceremony at which Dravo was awarded additional star signifying third renewal of Army-Navy "E".



LONE STAR BATTALION is name bestowed on 99th U. S. Naval Construction Battalion, as COMMANDER RICHARD R. COOK, left, officer in charge, accepts Texas colors from LT. COMDR. IAN H. MORGAN, who represented Governor Stevenson. First Seabee unit ever officially sponsored by a state. the 99th is at Pacific Coast advance base awaiting overseas assignment. Honorary Texas citizenship has been conferred on its entire personnel.



ALLIED ARMY ENGINEERS fill in road demolition on coast road in North Sicily after invasion.

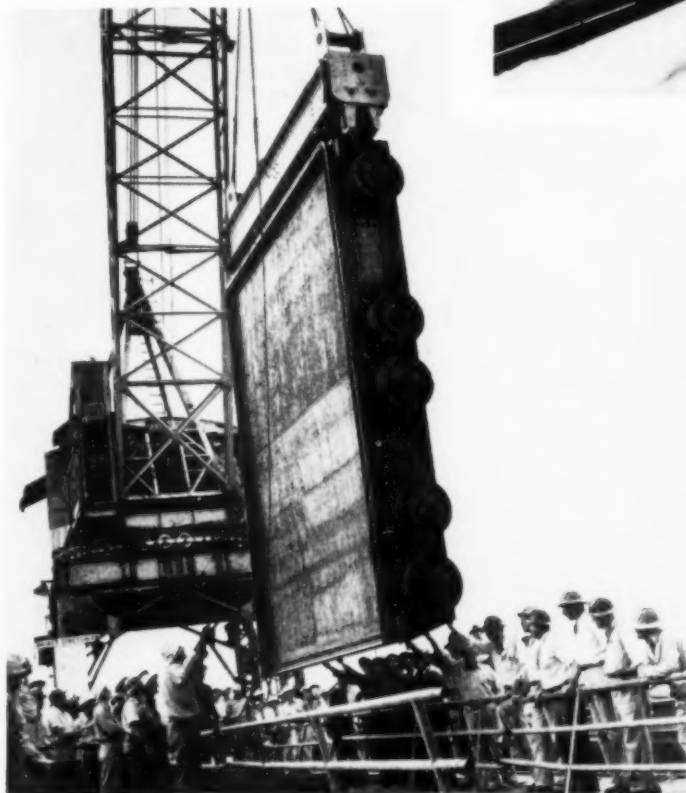
SIGNAL CORPS PHOTO



LACKING VALVES FOR REGULATION (right), water of San Joaquin River flows without restraint through permanent river outlets in California's Friant Dam, built by Griffith Co. and Bent Co. To provide additional irrigation water to San Joaquin Valley, U. S. Bureau of Reclamation will control two openings with valves borrowed from Boulder Dam and plug remaining ones until after war when permanent installations will be made. Control of these openings will permit storage in Millerton Lake, reservoir created by dam, and delivery of irrigation water into canals leading from it.



FORT LOUDON DAM (below) in Tennessee River is closed and impoundment of lake begins, with TVA Project Manager J. K. BLACK, fourth from right, in charge of operations. All-year deep-water channel throughout length of river will be completed with closure of Kentucky Dam.



WITHIN THREE MILES OF COMPLETION (right) when WPB ban halted work last winter, construction is resumed on 13.1-mi. Grand Lake-Big Thompson River tunnel through Continental Divide under Rocky Mountain National Park. Here **JOHN RAYMOND AUSTIN**, left, general superintendent on western end of bore, and **L. J. STIERS**, of Stiers Bros. Construction Co., St. Louis, Mo., inspect muck cars. S. S. Magoffin, of Englewood, Colo., is contractor on eastern end. Bureau of Reclamation has \$3,500,000 Congressional appropriation, plus \$700,000 from previous appropriations, to complete tunnel. First water will flow in crop year of 1945.

Theo. J. Barbre Photo



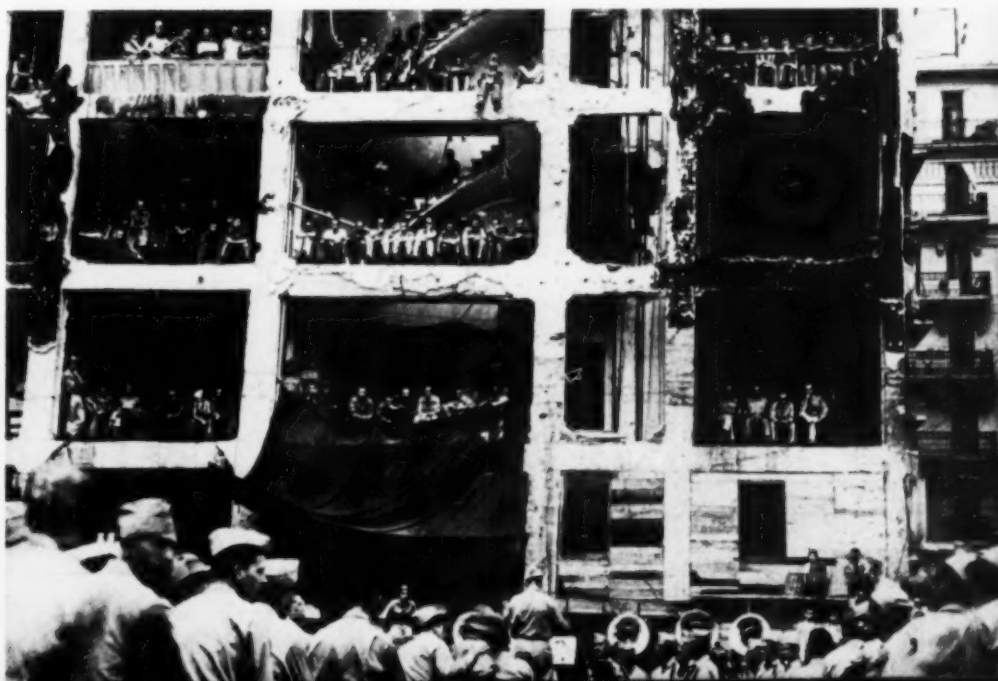
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BALCONY SEATS (below) for performance of U. S. Army band in African war theater are provided by open floors of building in Algiers from which walls were blasted away by bombs.

Signal Corps Photo
From Acme

NAMED FOR GEN. DOUGLAS MACARTHUR, newest, longest and deepest of four locks in Sault Ste. Marie Canal (below) is opened in formal ceremony. Important stimulus to Great Lakes shipping, new lock is capable of handling several big ore boats at one time. It will permit passage of greater tonnage of iron ore through canal which previously carried more freight than any other canal in world.

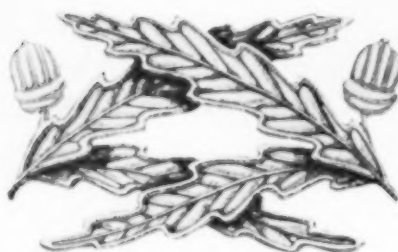
Press Assoc. Photo



Navy Construction

BY THE BUREAU OF YARDS AND DOCKS

Contract Awards for Wide Range of Structures for Shore Facilities Soared from \$36,000,000 in Pre-war Year of 1938 to \$2,700,000,000 in 1942



(All illustrations are Official Navy Photographs)



REAR ADMIRAL BEN MOREELL, Chief, Bureau of Yards and Docks, Navy Department.



REAR ADMIRAL LEWIS B. COMBS, Assistant Chief, Bureau of Yards and Docks, Navy Department.

TO CARRY THE FIGHT to the enemy, the Bureau of Yards and Docks of the Navy Department has been engaged in a giant construction program designed to provide shore facilities needed by the ships and aircraft of the fleet. Under the direction of Rear Admiral Ben Moreell, Chief of the Bureau, and Rear Admiral Lewis B. Combs, Assistant Chief, work has been pushed intensively, both in the continental United States and overseas, on a wide variety of structures, including shipbuilding and repair facilities, drydocks, marine railways, operating bases, ordnance depots, supply bases, fuel storage tanks, airports, hangars, training stations, quarters, hospitals, water and sewerage systems, roads, power plants, and many other engineering projects.

Private contractors have carried out the bulk of this construction, particularly that part located in the United States. Overseas, private contractors functioned very satisfactorily until the attacks on Pearl Harbor and on other Pacific islands underlined the fact that, in locations subject to enemy attack, future construction operations must necessarily be carried on by men trained to fight as well as to work.

Construction Volume Soars

The rapid growth in the volume of construction for the Navy is indicated by figures on contracts awarded by the Bureau of Yards and Docks, which grew from \$36,000,000 in the prewar year 1938 to \$85,000,000 in 1939; to \$404,000,000

in 1940; to \$945,000,000 in 1941; and to \$2,700,000,000 in 1942. The 1942 sum was 75 times as great as the 1938 figure or, from another angle, contracts aggregating as much as the entire year 1938 were awarded in 1942 every five days, on the average.

Contract awards for the first eight months of 1943 amounted, in round numbers, to \$640,000,000. While this amount is still large when compared with prewar volume, it is considerably less than the 1942 volume, and thus indicates that

the peak of construction work to be accomplished by private contractors has been passed. From now on, men and materials that have been used to build the naval plant—shipways, drydocks, training stations, ammunition depots, and the like—will become available, in increasing volume, for the production of munitions and for overseas service in the armed forces.

Seabees Build Advance Bases

Overseas, construction work for the Navy is carried out entirely by the Construction Battalions, familiarly known as the Seabees, whose personnel has been drawn largely from the construction industry. First organized at the time of Pearl Harbor, the Seabees now have an authorized strength of more than 200,000, more than 2½ times the enrollment of the entire prewar Navy. To them falls the task of clearing the jungles, constructing roads and bridges, erecting buildings, building docks and airfields, unloading ships, and the hundreds of other tasks that must be done in established advanced bases in the various theaters of operation. Not only must they build, but they must also defend themselves and their operations from enemy attack. Their versatility and ingenuity has been commended on many occasions, and is exemplified in their slogan, "Can do."

The accompanying official Navy photographs tell part of the tremendous story of the Navy's construction operations at home and abroad.

REPRESENTATIVE TYPES OF NAVY CONSTRUCTION

Lighter-Than-Air Docks
Naval Training Stations
Hospital Buildings
Warehouses
Drill Halls
Assembly and Repair Shops
Advance Base Construction by the Seabees

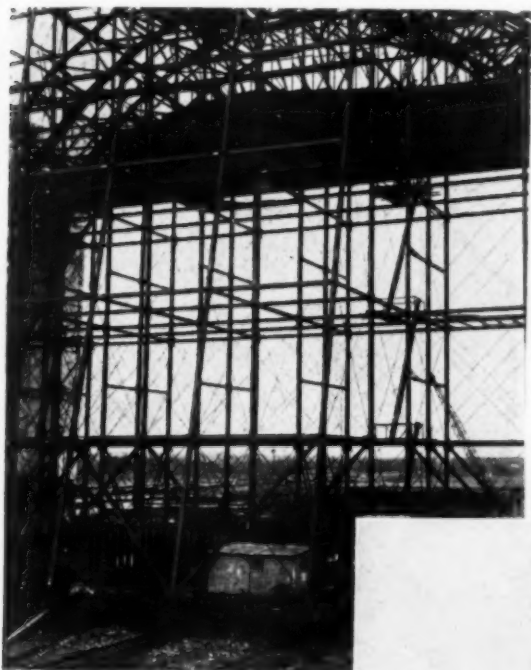
LIGHTER-THAN-AIR HANGARS

COASTAL PATROL and anti-submarine operations of the Navy have greatly increased its use of lighter-than-air craft. These must be provided with an unusual type of large hangar, or dock, where they can be repaired and serviced. Basic re-

quirements for these structures are a large, unobstructed floor area sheltered by a roof with an unusually large clear span and considerable height. Such docks are now completed or are approaching completion at a number of locations along

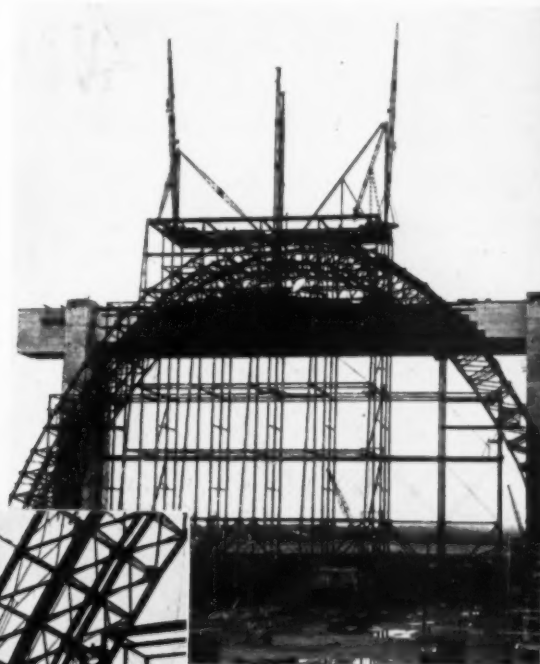
the Atlantic, Gulf, and Pacific coasts.

In order to conserve steel the Bureau of Yards and Docks has developed a wood frame dock design, illustrated herewith, which is used at most locations. The arches have a span of 246 ft. and a clear



STEEL FALSEWORK to support timber arches and erection derricks is mounted on railway flat-cars to permit easy shifting as work progresses.

Timber Construction



STIFF-LEG DERRICKS on top of falsework are used to lift assembled arch sections into position.

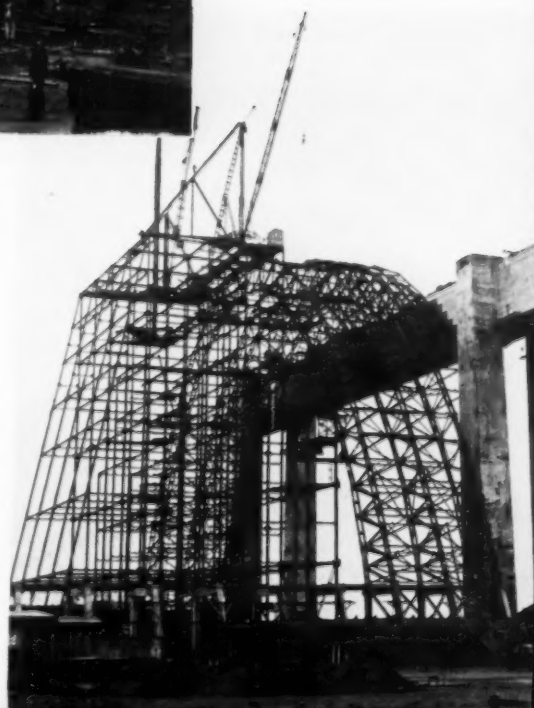


ARCH SEGMENTS of wood members are assembled in marked jigs at assembly yard near end of dock. Timbers are pre-fabricated and treated to resist fire.

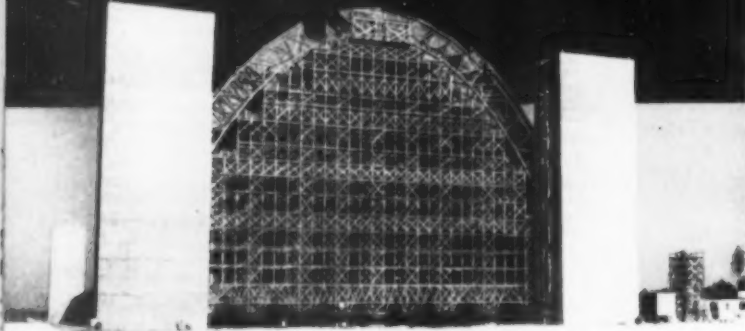


DOOR TRUSS (right) supported by concrete pylons anchors first roof arches to be erected. Note concrete A-frame foundations at arch bases to give added height.

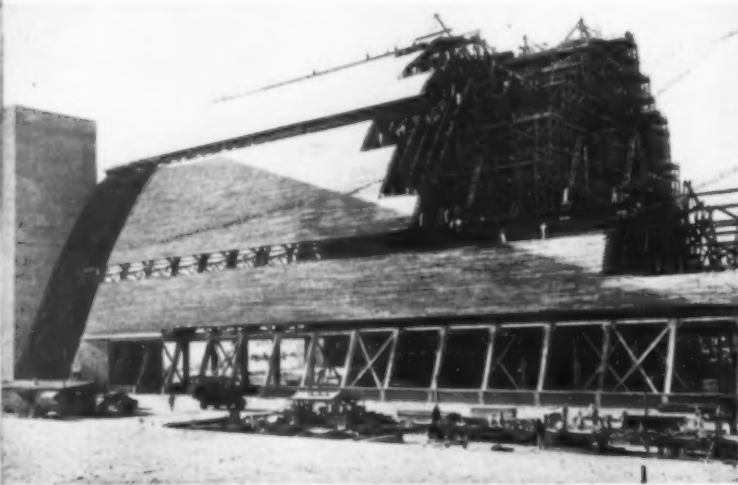
FALSEWORK (left) supports lower arch section while cross-bracing is installed.



LIGHTER-THAN-AIR HANGARS



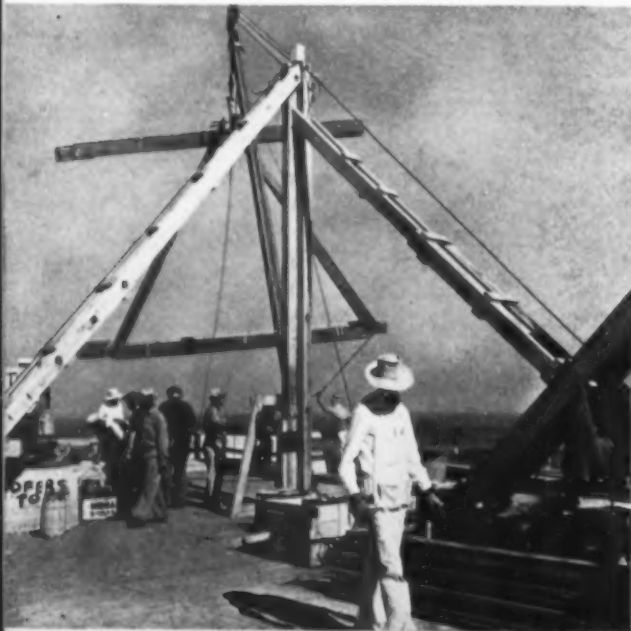
TIMBER FALSEWORK instead of steel, was used by the contractor for this structure. Gondolas instead of flat cars provide rolling foundation for moving falsework.



ROOF SHEATHING followed closely behind arch erection to provide lateral support. Openings are for windows.

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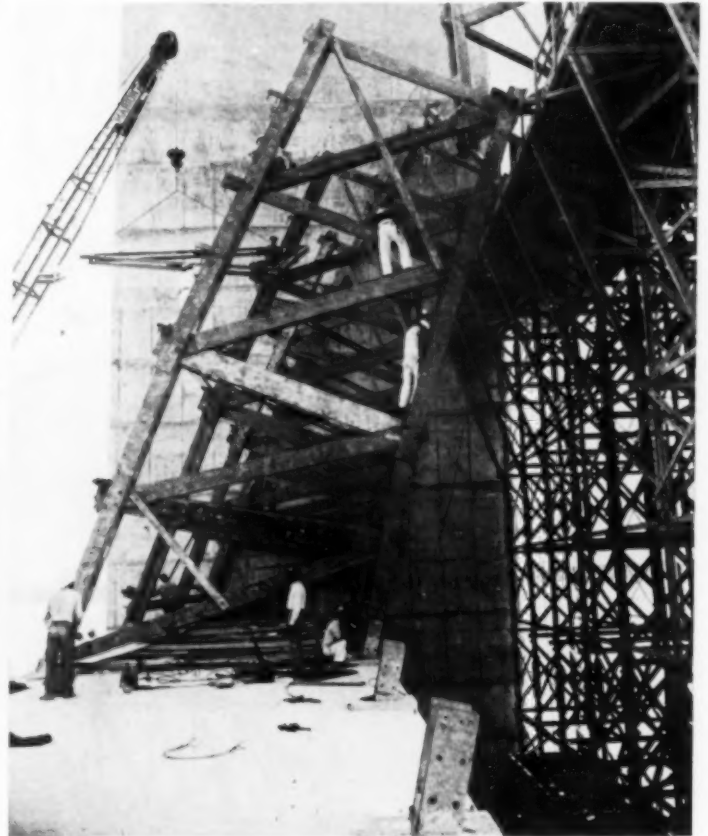
HOIST ATOP FALSEWORK (below) was extremely useful in raising materials and supplies. Note tight flooring on working platform.



height of 170 ft., part of which is obtained by basing each arch on concrete A-frames 24 ft. high. In this design the arch thrust is taken by the footings. Floors are concrete slabs; roofs are wood sheathing covered with tar paper and rolled roofing.

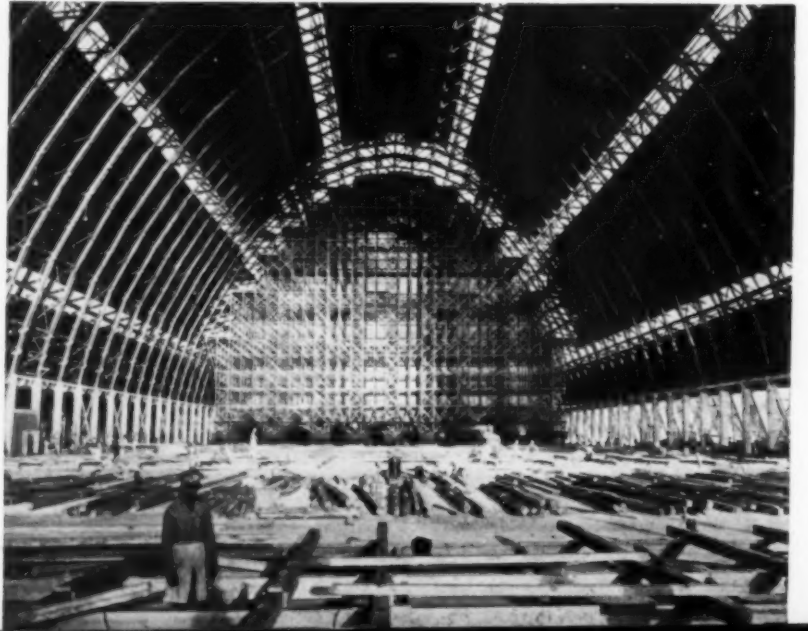
Timber truss members were pre-fabricated to exact size and shape, with bolt holes and timber connector seats bored, at the plant of Timber Structures, Inc. They were then shipped to the Protexol Co. for a fireproofing treatment; thence to the various sites for assembly and erection.

The method of erecting these huge structures was left to the discretion of the contractor at each job. In general, steel erection methods were used, sections of the trusses being assembled on the ground and hoisted into position by derricks. Movable falsework was used in most cases to support the first



FIRST ARCH SECTION is supported by falsework while cross-bracing is fitted between ribs.

MAGNITUDE OF DOCK (below) is indicated by this interior shot, taken as structure approached completion.

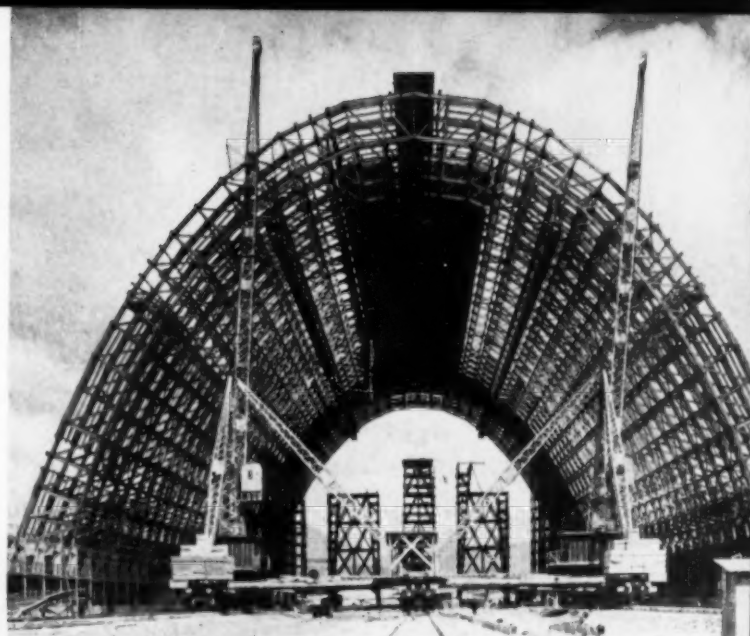


sections, pending completion of the arches and their connection to the standing part of the framework, and to provide working platforms. A number of variations in this method are illustrated.

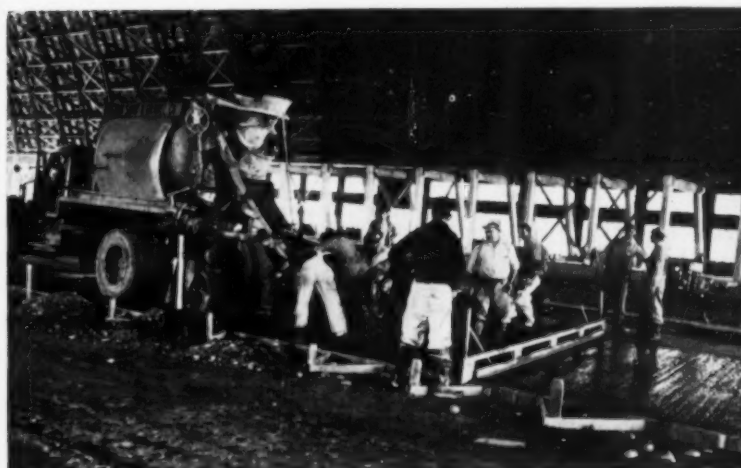
Doors to close the open ends of these large structures were, in themselves, a major construction problem. On the wood docks, six vertical panels 37 ft. wide, 120 ft. high, and 3 ft. 6 in. thick, each weighing approximately 30 tons, were mounted on wheels running on railway tracks across the opening. At the top, these panels were attached to a transverse box girder with a horizontal clearance of 220 ft. and a vertical clearance of 120 ft., which itself weighed over 300 tons. The girder was supported at each end by twin concrete pylons. When these doors are opened, the door panels nest between the two pylons on each side.



TIMBER CONNECTORS were used freely on both dock structure and wood falsework, shown here under erection.

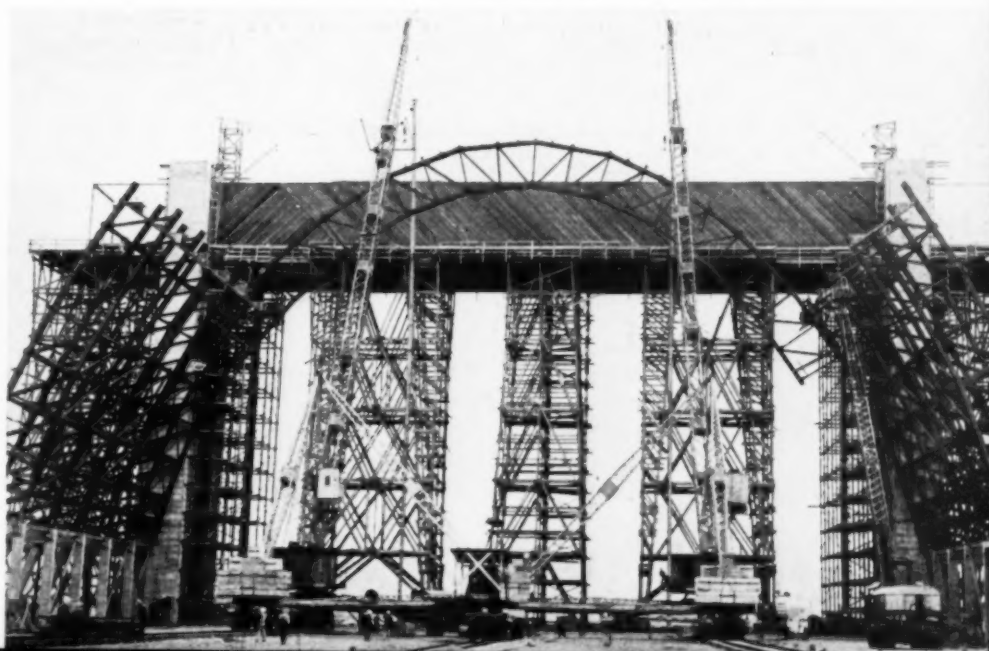
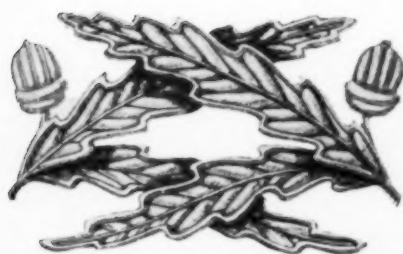


PARTLY-COMPLETED DOCK FRAME makes impressive pattern against sky. Space within A-frames at ground level is used for offices and workshops.



LAYING CONCRETE FLOOR over immense ground area covered by dock structure is simply a large-scale paving operation.

ERECTION OF ROOF ARCHES (below) by contractor on this dock was done from ground with aid of mobile, long-boom stiff-leg derricks. Side sections are self-supporting; central section is being hoisted into position.



Lighter-than-Air Hangars



ON STEEL FRAME HANGAR door erection begins after number of roof arches are completed. Both ground and elevated derricks are used.



BOTTOM OF ORANGE-PEEL door is supported by box girder running on semicircular track.

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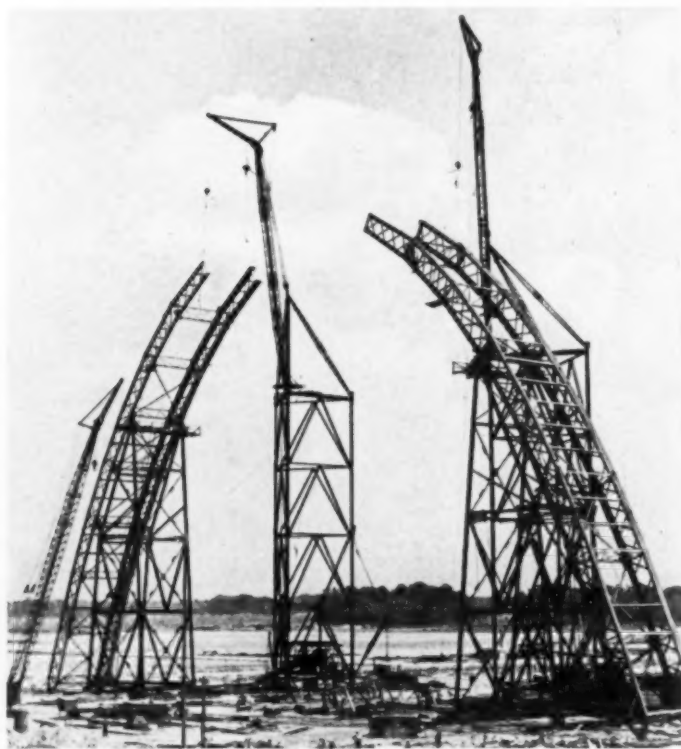
DOOR FRAME (below) nests closely to arches of dock roof. Door is supported by rollers on semicircular track.



STEEL-FRAME CONSTRUCTION

TWO OF THE FIRST AIRSHIP DOCKS to be erected in the current program that were designed before material shortages became acute utilize steel frames, instead of timber. The design called for steel arch truss ribs resting on pinned shoes, tied transversely with $1\frac{5}{8}$ -in. steel rods buried in the concrete floor. These arches have a span of 328 ft. and a rise of 185 ft. to the centerline of the trusses, which are 8 ft. deep.

The doors for these two docks are shaped like an orange peel, pivoted at the top of the roof arch and supported by rollers operating on a semicircular track.



FIRST STEP in erecting steel dock is assembly of two end roof arches. These are supported by falsework at third points while stiff-leg derricks mounted on triangular tower close arch.

DOOR FRAMES (below) pivot at center of roof arch. End frames are reinforced to take additional stresses.



Naval Hospital Construction

SICK OR WELL, the Navy takes care of its men. The current war, with its tremendous increase in enlisted and commissioned personnel and the need to take care of casualties in many theaters of action, has resulted in a large construction program embracing medical buildings of every description, from simple dispensaries to fully equipped hospitals and recuperation centers. Many of these are of a portable or temporary character.

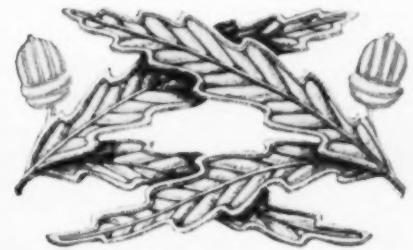
Unique and monumental among these facilities is the National Naval Medical Center, located just outside of Washington. The result of many years of planning, its construction was started in 1939 and, although delayed by war conditions, was completed in time to receive the first casualties from the fighting fronts. The Medical Center is more than a hospital, as it also contains research facilities and a number



USE OF WHITE CEMENT and quartz aggregates on facing of precast panels results in pleasing finish.



REINFORCED-CONCRETE FRAMING was used on all subsidiary wings and buildings.

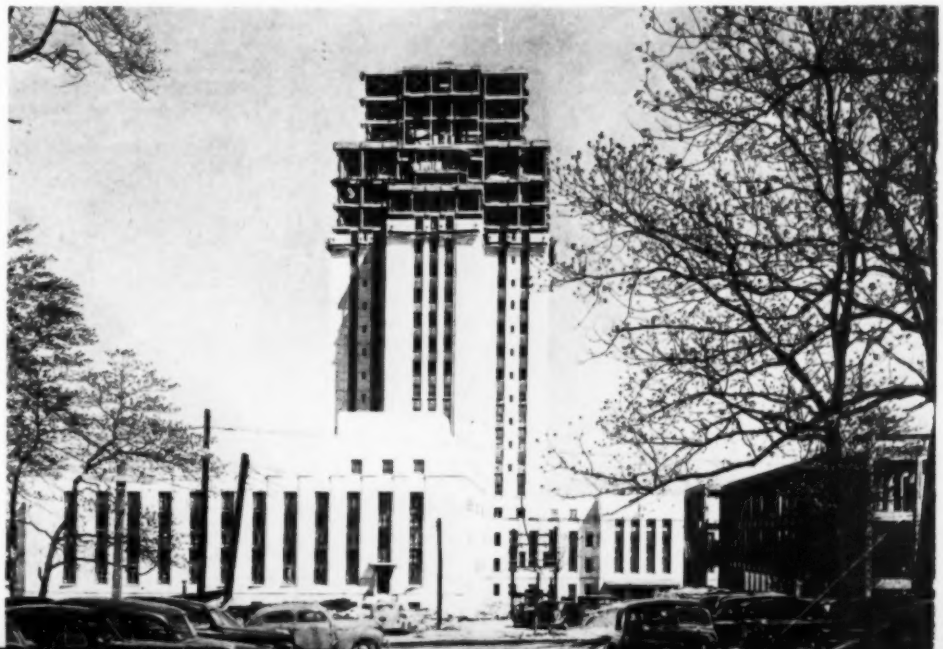


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of schools for the training of commissioned officers, enlisted men, and nurses in various fields of medicine.

Located on a 265-acre site, the Medical Center consists of a large group of buildings, most of them three-story or four-story reinforced concrete frames, dominated by a 20-story steel-frame tower in a central unit. Most of the exterior walls consist of precast, exposed-aggregate panels with an average thickness of 2½ in. Inside, a variety of marbles were used, and much of the wall surface is faced with architectural terra cotta.

CENTRAL TOWER (below), 20 stories high, consists of structural steel frame supporting precast concrete wall panels.





Dry Dock Construction

A DRYDOCK is a device whereby a ship can be removed from the water for cleaning and repairs to the underwater portion of the hull. Drydocks can also be used for ship construction; when the vessel is completed it is "launched" by admitting water to the dock.

There are two broad classes of drydocks: Graving docks and floating docks. The graving dock is essentially a large excavation at the shoreline into which a ship is floated. The end of the dock is then closed by a water-tight gate and water is removed by pumping. The graving dock is usually lined with concrete, and its construction involves a large quantity of excavation under difficult circumstances, preparation of a foundation capable of bearing the tremendous weights involved, the casting of the concrete lining, and construction of a closing gate or caisson. Operations may be performed under water or, if local conditions are favorable, the site may be inclosed by a cofferdam and work done in the dry.

A floating drydock is essentially a large box, one end of which is removable, with

UNWATERING large graving drydock is done after floor and part of sidewalls have been poured by tremie method. From this point on, work on dock is finished in dry.

hollow walls into which water may be permitted to enter or from which it may be excluded. In operation, the walls are flooded to submerge the dock, after which a ship is floated into position inside. Then the water is pumped out of the wall and floor spaces and the dock, rising in the water, lifts the ship above the surface. Floating docks are usually constructed in sections that are rigidly connected when the dock is in operation. When the dock itself needs underwater painting or repairs any one section can be detached.

The current drydock construction program has included floating docks built of steel and of wood. Normal construction practice is to build the individual sections on ways and launch them when nearly completed.

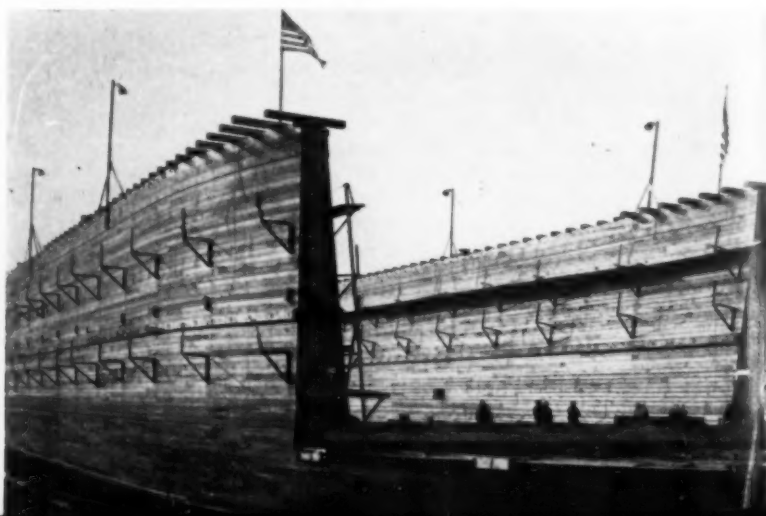


ENTIRE DOCK at this site was built in dry, protected by well points mounted on pump trestle shown in background.

COMPLETED GRAVING DOCK (below) in use. Note caisson closing dock at outboard end. Ship is U.S.S. Shaw, damaged at Pearl Harbor and fitted with temporary bow (detached, in foreground) for passage to mainland.



SECTION OF TIMBER FLOATING DRYDOCK (below) is ready for launching. Floating docks are sometimes towed considerable distances to point of use.

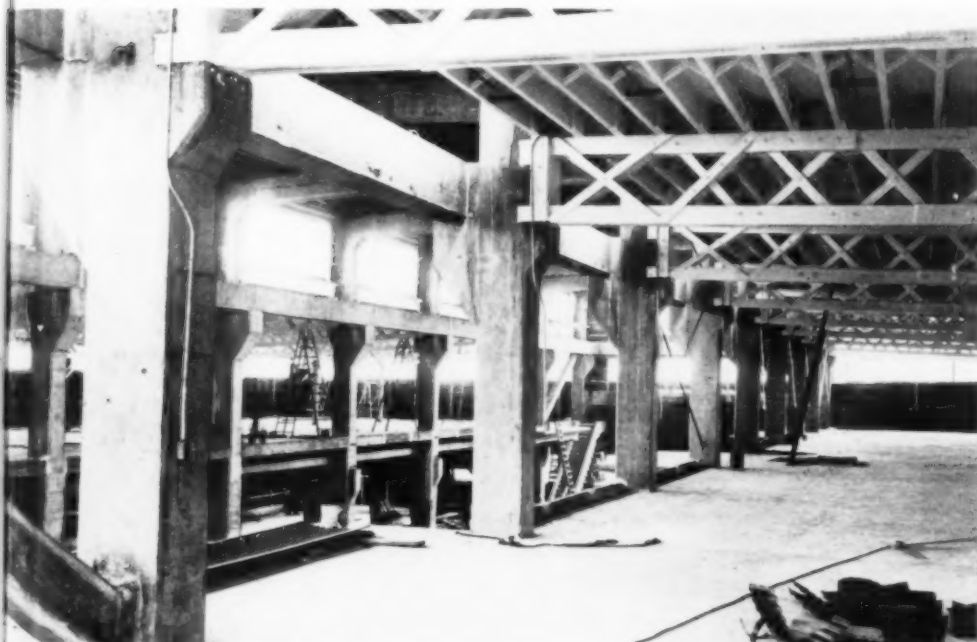


Ordnance Warehouse

ORDNANCE IS A TERM that, in Navy parlance, covers a multitude of items varying in size from a rifle bullet to the big guns and armored turrets for a battleship. All of these items, whether for original equipment or the replacement of battle damage, must be stored and protected from deterioration at navy yards and repair bases until needed. A large number of structures have been built for this purpose in a wide variety of locations. This page illustrates only one of these, a heavy-duty warehouse in which precast concrete units were used to make up a rigid-frame structure. This is another example of the way in which the Navy, through re-design, has effected large savings in the use of steel and other critical materials.

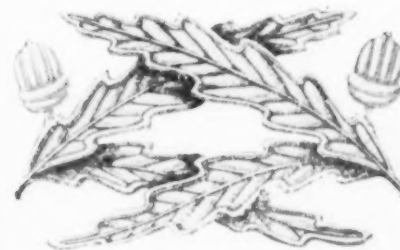


PRECAST CONCRETE COLUMNS are formed with steps to support rails of overhead crane. Note precast floor beams in position preparatory to joining operation.



CONCRETE CRANE RAIL BEAMS are in place, and timber trusses support light-duty floor. Structure exemplifies Navy savings in steel through re-design.

STRONG-BACK (below) is used to hoist precast roof beam into position over crane runway in constructing heavy-duty warehouse.



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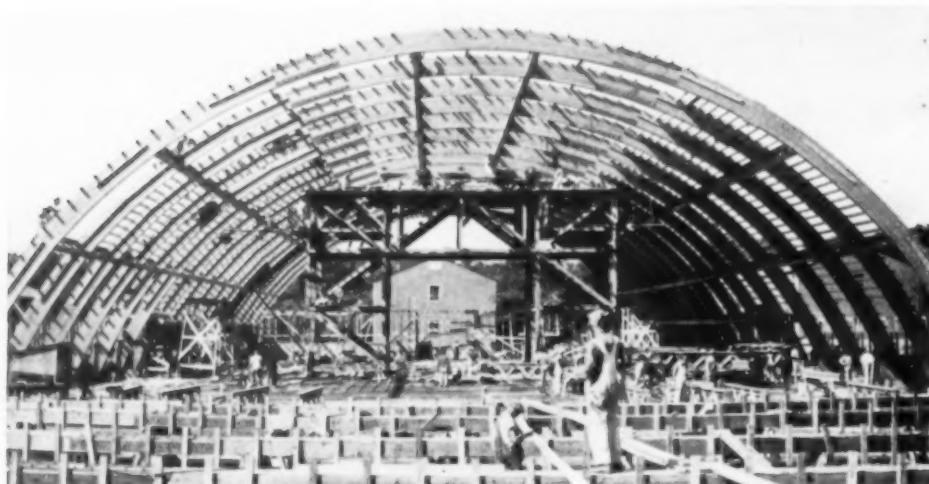
HEAVY PRECAST CRANE COLUMNS (below) are set in place by cranes.





NAVAL TRAINING STATION and BASES

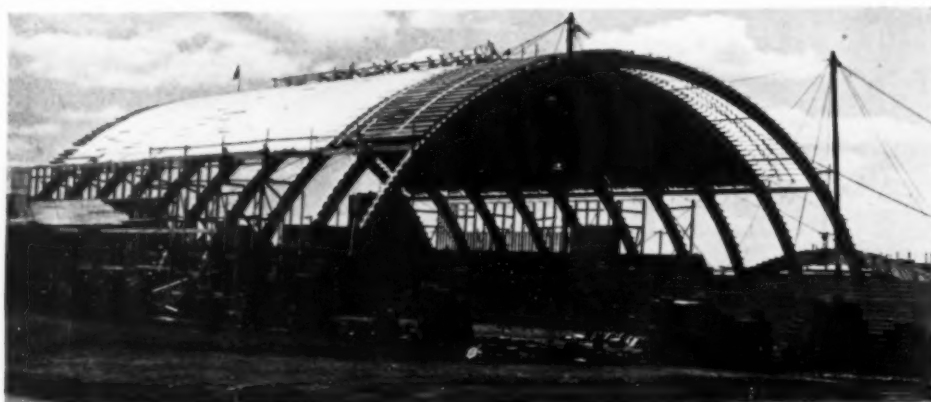
WOOD DRILL HALL (left) at Naval Training Station has an overall length of more than 600 ft.



MOVABLE SCAFFOLD gives access to interior of arches. Span at floor level is 120 ft. 6 in.; rise is 41 ft. 8 in.

TEACHING THOUSANDS of landsmen how to serve in the ships and aircraft of the expanding fleet required a large expansion in training facilities. Some of these give the initial indoctrination to "boots"; others concentrate in specialized fields, such as gunnery, communications, aviation, etc. Whatever its purpose, the training station is essentially an educational institution. It requires living quarters, class rooms, laboratories, indoor and outdoor areas for mass instruction, athletic fields, medical facilities, administration offices, and many other facilities.

THIS DESIGN (right), with minor variations, was used at many sites. Here, at another station, laminated timber arches are being lifted into place by two gin poles.



HANGING SCAFFOLDS (left), are used by this contractor. Excavation in front is for swimming pool.

MISCELLANEOUS STRUCTURES

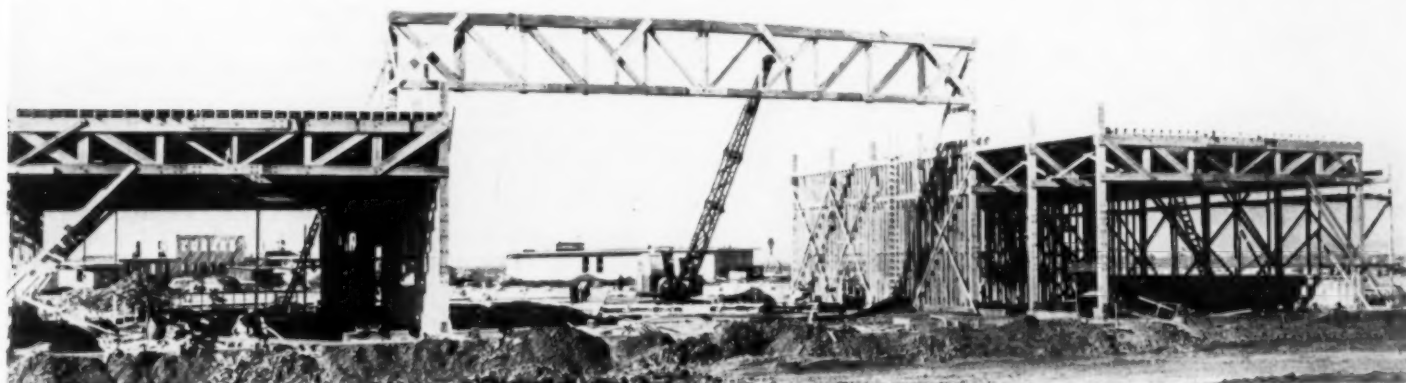
HANGAR FOR LAND PLANES (right) utilizes long-span timber roof trusses with center supports. These trusses are assembled on ground and hoisted into position.



THE LIMITED NUMBER of engineering works illustrated in these pages cannot begin to cover the tremendous variety of structures required by the needs of a rapidly expanding Navy. From aqueducts to wharves, the list includes such disparate projects as finger piers, fuel storage tanks, mooring masts, marine railways, and weight-lifting apparatus, to name but a few. On this page is illustrated the type of drill hall construction which is accomplished at naval training stations in order that inclement weather shall not interfere with the rigid schedule of instruction.



ANOTHER HANGAR, of construction similar to that illustrated above, is here shown at later stage of progress.



LIGHT TIMBER TRUSSES are used on this three-bay assembly and repair shop for aircraft.

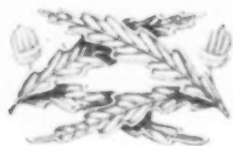
LAMINATED TIMBER COLUMNS (right) obviate use of heavy-dimension timbers on this type of structure.



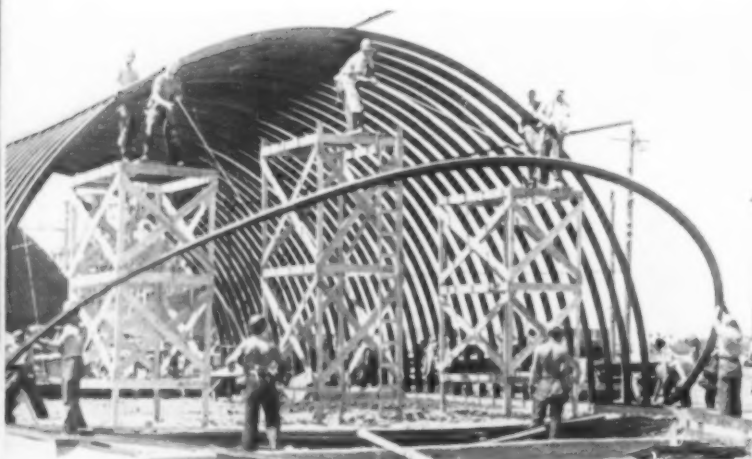
AMID LUXURIANT TROPICAL GROWTH (below), Seabees use native coconut logs to bridge small stream.



FOR STREAM CROSSINGS (below), pile-supported trestles are built with aid of piledriver by Seabees.



ADVANCE BASE CONSTRUCTION B



PREFABRICATED STEEL WAREHOUSES, 40x100 ft. in plan, provide protected storage at advance base.

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THE SHIPS AND AIRCRAFT of the U. S. Navy depend for their continued operation upon shore bases from which they obtain munitions, fuel, supplies, repairs, and other essential services. A ship en route between its base and the theater of operations is not, of course, available for fleet operations; hence, in a very real sense, the existence of bases at locations conveniently close to the fighting zone adds appreciably to the effective strength of the fleet.

In this global war the Navy is operating in all of the seven seas, often thousands of miles from pre-war bases in U. S. territory. It has been necessary, therefore, to establish a large number of advance bases, many of them in remote and primitive sections of the world.

The term "advance base" is elastic; it can be applied to anything from a gasoline dump for PT boats up to a highly developed center that may include piers, wharves, warehouses, fuel-storage tanks, air fields, hangars, repair shops of many kinds, and even a drydock. Operation of such an establishment may require several thousand men, who must be provided with housing, water supply and sewerage systems, communication facilities, hospital accommodations, and other necessities.



SEABEE WELDERS (left) make short work of cutting perforated runway strip for advance airfield.

PILEDIVING RIG (right) places fender piles to guard bridge from floating debris in flash floods.



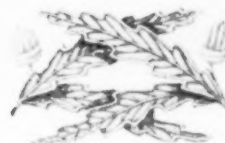
THOUSANDS OF MILES (below) from their fellows in tropics, Seabees transfer their gear from transport to Aleutian camp.



FAMILIAR EQUIPMENT (below) operates in strange setting; gasoline-powered mixer enables Seabees to pour concrete foundation.



ON BY NAVY'S SEABEE UNITS



And, since enemy attack is always possible, it also includes gun emplacements, camouflage, and other installations.

Speed is of the utmost importance in establishing an advance base. As a rule, the need precedes the availability of the site, and physical occupation is not possible until ships and aircraft have already participated in action nearby. Then the base must be constructed as rapidly as possible in order to provide facilities vitally necessary to the fighting forces. Much use is made of prefabricated buildings and tanks, and special equipment is designed for portability and rapid assembly. One very useful device is the ponton, which is simply a large hollow steel box equipped with fastening devices so that groups of these units can be rigidly assembled to form a pier, a barge, or even a small drydock.

Building and maintaining advance bases is the principal function of the Navy's Construction Battalions, or Seabees. These men have been enlisted largely from the construction industry. Seabees are trained to fight as well as to work and are capable of defending the sites of their labors from enemy attack. Their present enrollment is larger than that of the entire pre-war Navy.



ASSEMBLING PREFABRICATED TANKS for fuel oil, diesel oil, and gasoline storage, is important job for Seabees.

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ADAPTABILITY is by-word with Seabees, who slit metal gasoline drums, flatten them with road roller and use sheets for roofing and other construction purposes.



NATIVE WORKERS in South Pacific help in construction of explosives magazine of igloo type, with arched roof of corrugated metal protected by sand bags, as Seabees construct advance base.





PEACE RIVER BRIDGE with main cable suspension span of 930 ft., enters final construction stage with completion of floor to support concrete roadway. Project was finished just seven months after signing of superstructure contract.



FIRST STEEL IS PLACED in legs of south tower. Erection tower, with boom reaching to height of 250 ft., is mounted on skids supported on 4-ft. ice.

Race With Ice Break-up Won as

Peace River Suspension Bridge

On Alaska Highway

Is Built in Record Time



CONSTRUCTION PERSONNEL outside recreation hall at Camp Roebeling includes (left to right): CRAIG MEADE, OSCAR PARKER, HOWARD AMOSS, KINSEY DICKEL, WALTER VOGHT, and HAROLD HILLS.

ICE BREAK-UP (below) begins on Peace River, just few days after north bridge tower was completed and erection tower was dismantled. Temporary bridge was swept away by ice floes.

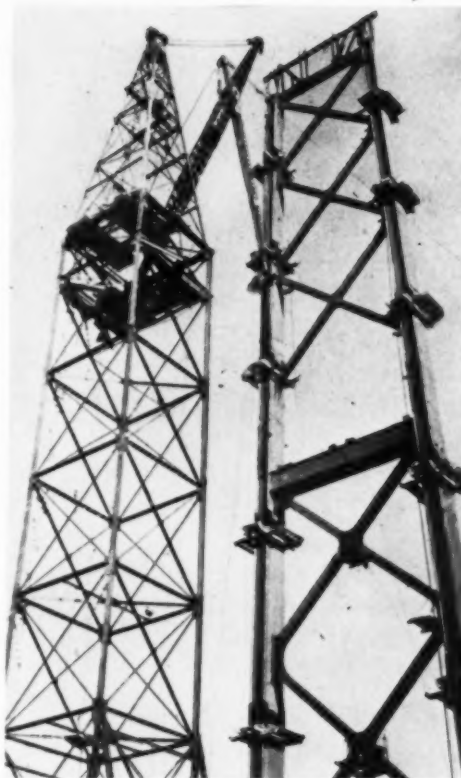




WITH A DEADLINE set by the spring break-up of the ice, builders of the steel suspension bridge over Peace River near Fort St. John, B.C., completed the longest structure on the Alaska Highway just seven months after the superstructure contract was signed. Speed was imperative, since it was decided to work on the ice in erecting the main towers, which meant that the bridge towers had to be erected and the erection tower dismantled by early April when the break-up could be expected.

Contract for furnishing, fabricating and erecting the entire superstructure was awarded by the Public Roads Administration to John A. Roebling's Sons Co., of Trenton, N. J., builders of the Niagara and Brooklyn bridges and manufacturers and erectors of the giant cables of the Golden Gate Bridge and the George Washington Bridge between New York and New Jersey. The concrete piers for the bridge towers and the steel cable bents and anchorages for the cables were built by the Dufferin Paving Co., of Toronto, Canada. In charge of the work for Roebling were Walter Voght, general superintendent, and Harold W. Hills, resident engineer.

Ice on the river at the site attains a thickness of 4 ft. and breaks up in pieces



CHICAGO BOOM attached to bridge structure is used to dismantle erection tower after completion of north tower just in time to avoid ice break-up.

CELLULAR CONCRETE BLOCKS (below) filled with gravel formed anchorages for bridge cables. About 7,500 cu. yd. of concrete was placed in each anchorage. Blocks for cells were keyed and interlocked to avoid slippage.

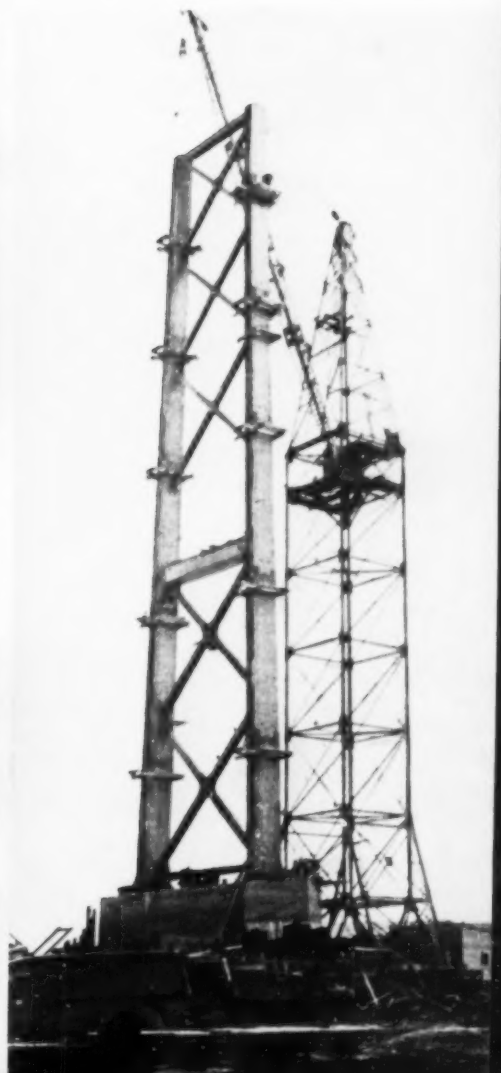


SUSPENDERS are set from which steelwork of roadway trusses will be hung. At top are high-line cables that carried tramway cars for placing cables and steelwork.



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NORTH TOWER (below) is topped out by boom of erection tower, which has reach of 250 ft.

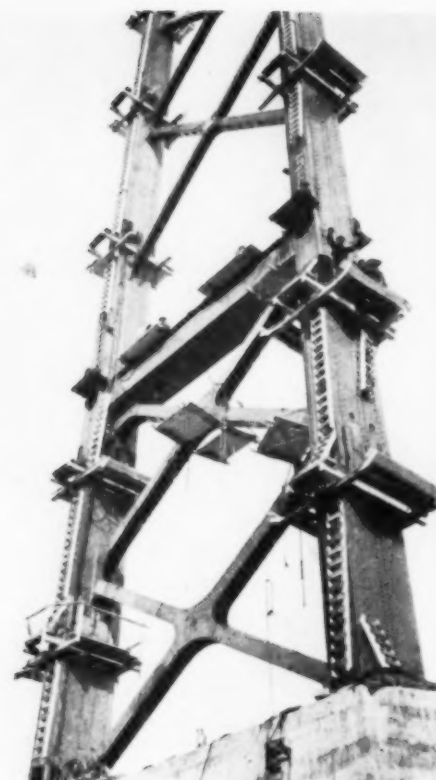




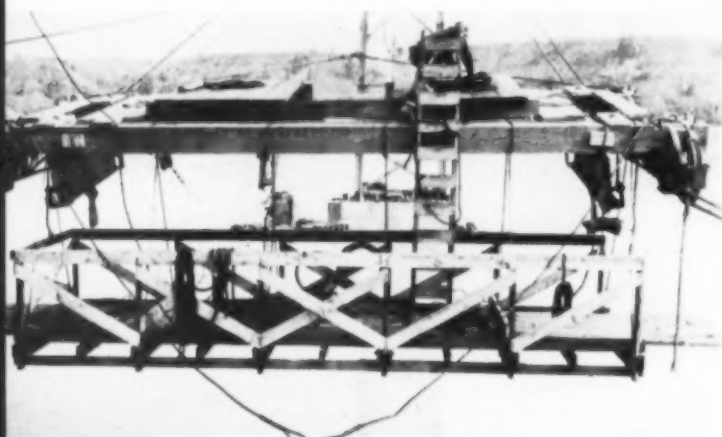
ANOTHER STRAND OF CABLE is placed in metal saddle at top of south tower, as collection of strands is built up to form giant bridge cable.



ERECTION TOWER is skidded across ice from south to north bridge tower after completion of former. Note reeving used to pull derrick.



RIVET SCAFFOLDS are in place on tower. Note trial platform, lower left, with hand rail and subsequent design at right, with slope board.



HIGHLINE CAR is rigged for cable band and suspender placing.

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WORKERS ON PEACE RIVER BRIDGE (below) are housed at Camp Roebling, built before work on bridge could begin.



as large as 700x2,000 ft. The stream was bridged last year by a temporary timber trestle, but it was realized then that this type of crossing might have to be replaced three or four times a year. Due to the ice conditions and the deep foundations necessary, a single span across the main channel was considered best. A suspension bridge with a main span of 930 ft. and loaded back stay spans of 465 ft. was selected as best suited for the erection conditions. Falsework was out of the question. Two deck truss spans of 135 ft. were interposed between the cable bents and the anchorages to make the overall length of the bridge 2,130 ft. The concrete slab roadway is 24 ft. from curb to curb and curbs are 18 in. high. The deck structure is suspended from two open-type parallel strand cables. Each cable consists of twenty 2 1/16-in. strands, spaced approximately 4 in. c. to c., and held in position by cable clamps at each hanger and at the saddles.

Before work on the bridge could begin, Camp Roebling had to be constructed for accommodation of the workers. Conditions which they faced are indicated by the weather reports which read "20 below at daybreak" and the instructions issued by the superintendent: "Have every man bring along overshoes,

(Continued on page 142)

NORTH TOWER SECTION (below) is backed down steep grade for delivery to north tower pier over roadway about 2 ft. wider than truck-trailer.



Present and Accounted For...A PAGE OF PERSONALITIES



FIELD OPERATIONS in construction of synthetic rubber plant at Houston, Tex., are directed for George A. Fuller Co. by: (Left to right) L. W. COOK, carpenter superintendent; G. G. CLAYTON, equipment foreman and C. C. DeARMOND, field superintendent.

Houston Chronicle Photo



DIRECTING ALASKAN PROJECTS of Morrison-Knudsen Co. is C. RAY SHINN, vice-president, who spends most of his time at jobs or flying between them and Seattle headquarters.



PRESTRESSED CONCRETE TANKS under construction by Bureau of Yards and Docks for Navy Department are subject of discussion as LT. COMDR. J. P. PLICHTA, left, resident officer at site, threshes out latest problem with J. R. GRUBE, job manager for Leonard Munroe Construction Co., contractor.



NEW COMMISSIONER OF RECLAMATION is HARRY W. BASHORE, who has been with the Bureau of Reclamation for 37 years and served as assistant commissioner since May 27, 1939.

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ATTENDING CONFERENCE (below) of branch and regional directors of newly decentralized Bureau of Reclamation are, left to right, front row: W. F. KUBACH, director of fiscal and administrative management; S. O. Harper, chief engineer in charge of design and construction branch; JOHN C. PAGE, consulting engineer; H. W. BASHORE, commission-

er of reclamation; W. E. WARNE, assistant commissioner; JOHN S. MOORE, director of operations and maintenance; E. B. DEBLER, director of project investigations; second row: Regional Directors E. A. MORITZ, C. E. CAREY, F. A. BANKS, H. D. COMSTOCK, E. O. LARSON, W. R. NELSON; third row: L. J. MORAN, assistant director of fiscal and

administrative management; Assistant Regional Directors R. J. NEWELL, L. J. FOSTER, R. S. CALLAND; L. R. SMITH, assistant director of fiscal and administrative management; fourth row: G. W. LINEWEAVER, chief of information; J. K. CHEADLE, chief counsel; J. C. THRAILKILL, chief clerk, Yuma, Ariz.; and H. R. STINSON, assistant chief counsel.





SCAFFOLDING IS HUNG directly on hull of LST (Landing Ship for Tanks) under construction at Dravo Corp. shipyard. This eliminates necessity of removing scaffolding each time ship moves sideways on transfer carriages to new assembly berth, as described elsewhere in this issue.



TO SAVE CRITICAL MATERIAL, creosoted piles of guide fenders for floodgate structure of U. S. Engineers, Galveston District, are capped by galvanized metal collars filled with asphalt in lieu of conventional galvanized metal hoods. Contractor is Tellepsen Construction Co., of Houston, Tex.

HOW

They Did It

CONSTRUCTION DETAILS

*For
Superintendents and Foremen*



X-RAY MACHINE on rolling carriage, equipped with winch to control movement, tests field-welded girth joints in erected 18-ft. dia. steel penstock pipes at Norfolk Dam, U. S. Engineer project being rushed to completion on North Fork River in Arkansas by The Utah Construction Co. and Morrison-Knudsen Co., Inc., contractors.

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ARCHED ROOF (below) of corrugated metal for explosives magazine is erected by Navy's Seabees at base in South Pacific. Completed roof is later protected by sand-bag cover.

Navy Official Photo





UTILITY WELDING TRUCK carrying both electric welding generator and gas tanks for oxyacetylene cutting and welding supplies current to arc welding operator (right) of Good Roads Engineering & Contracting Co., Wantagh, L. I., N. Y., depositing metal to build up worn track rollers of tractor.



BATTER BOARD STAKES (left) are driven with portable air hammer driver, as ground is too hard for driving with sledge hammer. Workers for Barrett & Hilp, contractors on Vallejo, Calif., community hospital project, cut, point, and drive more than 200 stakes in 3 hr.

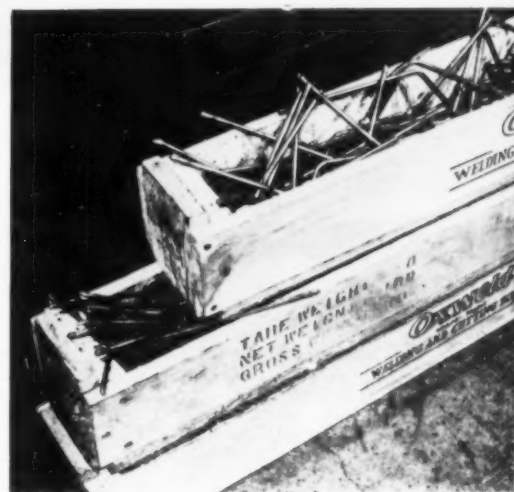
TOLL TELEPHONE CABLE (below) is laid by Caterpillar diesel D8 tractor between Chicago and Rockford, Ill. Cable-laying plow weighs 3½ tons; plow share 4½ in. wide extends 4 ft. into ground; reel trailer weighs 2½ tons, and full reel of cable weighs 4 tons. At times four D8s were required in order to pull train which had total weight of 10 tons through mud.

WELDING ROD STUBS can be accumulated in wooden boxes (right) provided for purpose and welded together later for re-use. Homemade jig (below) consisting of light angle-iron trough speeds up splicing operation with oxyacetylene blowpipe. One stub is held by spring-operated clamp and next stub to be welded on is placed in bottom of vee and shoved into position by "pusher". Piece



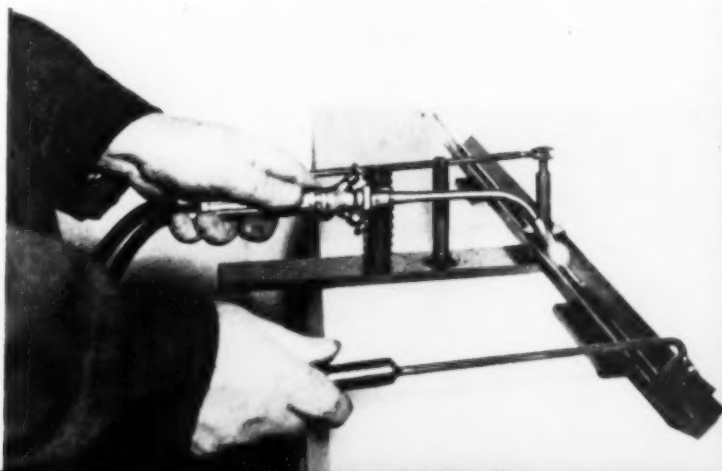
HOLES ARE DRILLED with earth auger powered from tractor axle for pier foundations at Pocatello, Idaho, housing project. Built by Morrison-Knudsen Co., of Boise, 31 apartment buildings are set on concrete pier foundations.

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of 5/16-in. steel plate, welded to under side of angle iron beneath point where rods are to be joined, serves as chill block to prevent trough from being overheated during welding operation.

Linde Air Products Co. Photo



THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS



"We have one shovel operator available and he wants all you contractors to submit bids."



"It's your birthday cake. I thought you'd like it served this way!"



"Life insurance, Mister?"



LAUNCHED SIDEWAYS, an LST ship enters water from inclined skids. Looking on are workmen on next hull in line, which will soon be moved into launching position. Launching is started by cutting simultaneously all ropes holding six sleds. In going down ways ships attain speed of 12 to 15 m.p.h., but speed is quickly dampened as they strike broadside.

Landing Ships for Tanks

**ARE MOVED ON ASSEMBLY LINE
BY TRANSFER CARRIAGES
AND LAUNCHED SIDEWAYS**



ADAPTING MASS PRODUCTION METHODS to construction of medium-size ocean-going vessels, the Dravo Corp., of Pittsburgh, is using welding and pre-assembly for speed and economy in building LSTs (Landing Ships for Tanks) for the Navy. Built on a 625-ft. assembly line and moved on special transfer carriages toward water as construction advances, the ships are launched sideways.

The unusual building and launching technique for these vessels, which figured importantly in the invasion of Sicily and the operations off Munda, is designed to make the most of available waterfront space by completing as much of the hull construction as possible before the ship reaches launching position. Progressive movement of the hull from one building berth to another distributes the work evenly over the available yard space and minimizes the amount that has to be done at the water side. Sidewise launching permits assembly on an even keel, with

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UPPER STERN ASSEMBLY is lowered into place by two full-revolving, electric-powered cranes.

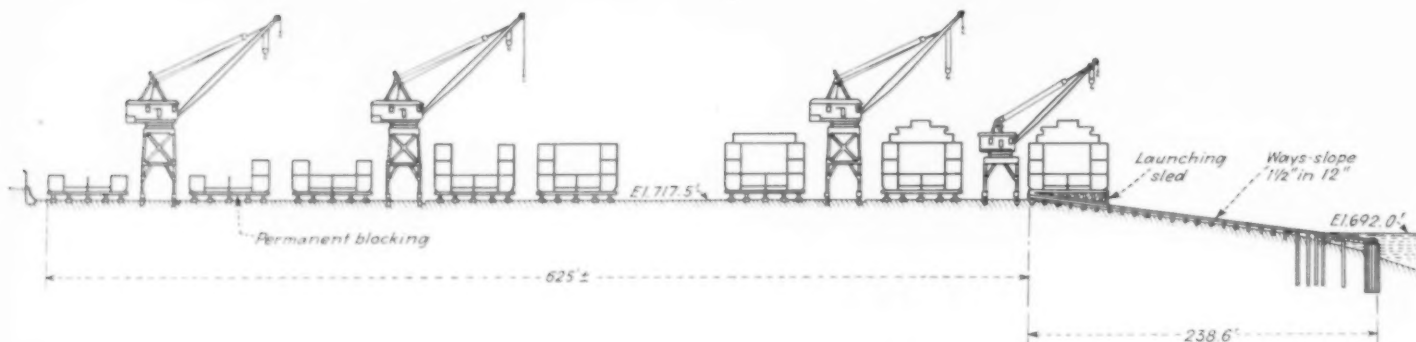


GANTRY CRANES, working in pairs (below), turn and place 57-ton lower stern assembly in position.



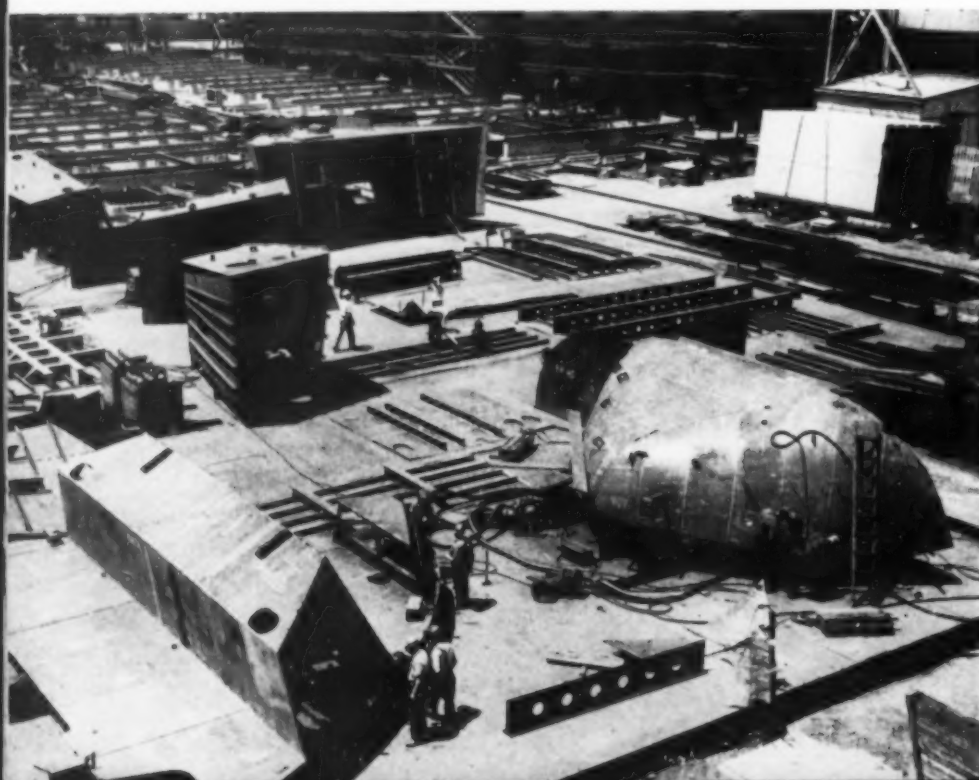


MOVED BY TRANSFER CARRIAGES operating on track system, hulls progress gradually to river as they near completion.



SHIPS GROW as they move toward river through seven building berths to launching ways. Transfer carriages shift progressively assembled hulls from berth to berth.

BOW AND STERN SECTIONS (below) are built in inverted position on platens of steel I-beams to permit downhand welding, which gives better welds in less time and reduces training time for workers. They are built on jigs to save fitting time.



access to the full length of the hull. During launching, the hull is not subjected to stresses in excess of those during normal operation.

The final assembly is composed of sub-assemblies in the form of box-like sections so simple that actual construction can be spread over available shops within a reasonable shipping radius of the assembly yard. This permits much of the fabrication work to be done under roof on a 24-hour-day basis and delivered to the shipyard by rail, truck and barge. Preassemblies are prepared on tilting tables so that 80 to 90 percent of the required welding is accomplished downhand.

The preassembled sections are brought to the assembly area on railroad flatcars and unloaded either on two steel-beam platens, where they are joined into still larger preassemblies, or directly on the shipbuilding berths. The berths are parallel to the riverfront and arranged to permit moving the ship sideways from one berth to the next as it is built up.

A group of eight full-revolving, elec-
(Continued on page 146)

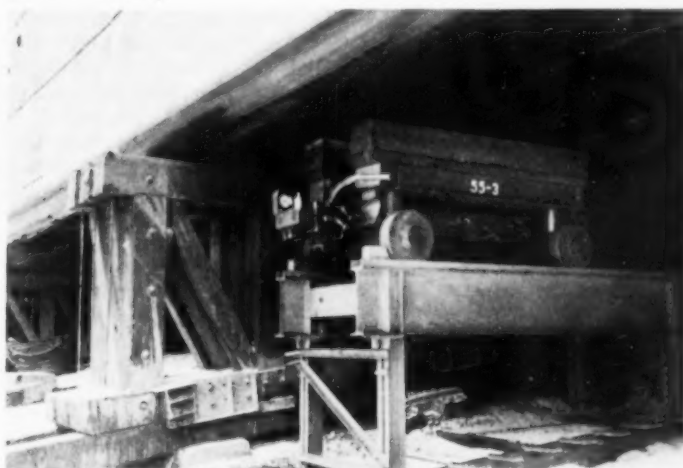


HAND-OPERATED PUMP (right) connected to four 30-ton hydraulic jacks on transfer carriage raises partially assembled ship from blocking for transfer to new position. Pump is worked until predetermined reading is obtained on dial to insure uniform lift for entire hull and avoid undesirable stresses.



LAUNCHING CRADLE is wedge-shaped to conform with slope of skids and maintain hull at even keel until it lands in water. Cradles and skids are greased, with six cradles required for one LST. Simultaneous chopping of ropes at six skids releases ship.

LST PREASSEMBLIES are conveniently placed in yard for handling by full-revolving, electric-powered cranes on 54-ft. high portal gantries of self-propelled type. Bow and stern sections too large for shop assembly are preassembled in yard (right background). At left center is lower portion of stern section which has been turned and is ready to be placed in position on waiting hull.



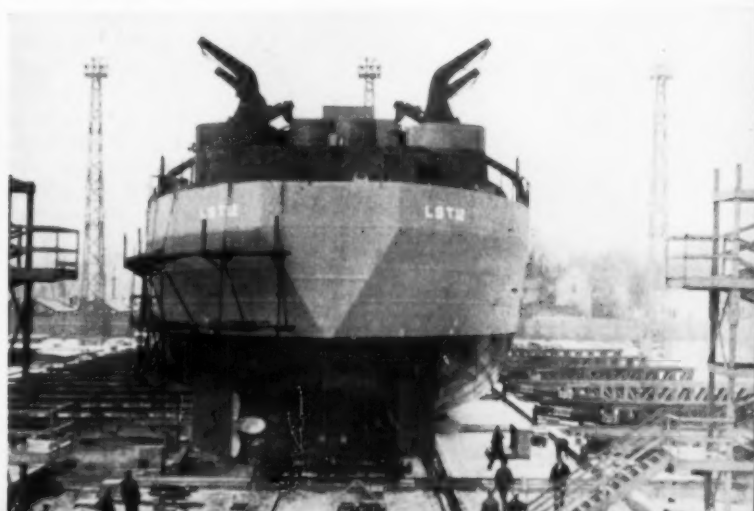
TRACKS AT RIVER EDGE are arranged to permit transfer carriages to remain under hull for full length of movement. After ship's weight is shifted to launching sleds, carriages are withdrawn, supports are removed and transfer track structure is dropped to inclined position.

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STORED AT SHIPYARD (below) of Dravo Corp. are box-like prefabricated sections of LSTs made in company's own structural shop or shipped from five other plants in vicinity.



HULL MAKES FINAL MOVEMENT (below) from last building berth to launching cradles, right. Seven parallel tracks, each equipped with set of transfer carriages, are used.





for FUTURE

By H. E. Foreman
Managing Director
The Associated General
Contractors of America
Washington, D. C.

THE ACTIVITIES of The Associated General Contractors of America in planning future construction markets are based, first, upon the conviction that private enterprise has the responsibility to take the leading part in the future development of the nation and of providing each individual willing and able to work the freedom of opportunity. They are based, secondly, on the need for both public and private organizations to start the immediate preparations of plans and specifications and the acquiring of sites for needed and worthwhile projects so that construction can start as soon as the war ends, or other conditions permit.

As the association sees it, the war has shown us what we can do. The war has demonstrated that the nation can plan with boldness, courage and vision and can execute its plans with vigor and determination. It is not idle dreaming to use as a yardstick for future work the war accomplishments of the construction industry, made at a time when the nation's young men were being drawn into the armed services. The future, the association believes, offers the opportunity to realize our full potentialities for the creation of a greater and better nation, and the accomplishments of the war serve as precedents for planning that future.

Three Levels of Planning

In planning future construction markets for general contractors there are what might be referred to as three levels of planning:

One is the national level in which the construction industry, in cooperation with other industries, works to bring about conditions which will allow all industries, including construction, to develop to the fullest extent after the war.

The second is the local and regional level, in which groups of contractors work to bring about favorable business conditions in their communities.

The third is the individual level, in which each general contractor exercises his own ingenuity to procure and execute

construction work, and aids in the work on the other levels.

The purpose of this article is to discuss the work to be done on the national level by The Associated General Contractors of America, Inc.

Earlier issues this year of *Construction Methods* have described work being done on the individual and local levels. An article in May (p. 54) described work of the Turner Construction Co., A.G.C. member, in developing post-war jobs. An article in July (p. 60) described activities of the Constructors Association of Western Pennsylvania. In August (p. 66) an article described the cooperation in Houston, Texas, between the A.G.C. Houston Chapter, the South Texas Chapter of the American Institute of Architects, Houston Engineers Club, Producers' Council Club of Houston, and the Houston Building Trades Council.

A.G.C. Organization for Planning

The Association's Market Development Committee, of which Fred I. Rowe, president, W. L. Johnson Construction Co., Hicksville, Ohio, is chairman, has responsibility for recommending planning activities to the A.G.C. The A.G.C. Secretaries Council has a special committee, of which Roy A. MacGregor, executive secretary, Constructors Association of Western Pennsylvania, is chairman, which has recommended how A.G.C. chapters may carry out their planning work. The responsibility for planning work on the national staff is centered in the Managing Director.

Particularly close cooperation is maintained in the planning work of the A.G.C. and the American Society of Civil Engineers through A. J. Ackerman, Dravo Corp., who is a member both of the A.G.C. Market Development Committee and the Am. Soc. C. E. Post-war Construction Committee. Close cooperation also is maintained with the United States Chamber of Commerce through two of its past-presidents who are members of the board and members of the Construc-



H. E. FOREMAN, author of the accompanying article on planning future construction markets, is managing director of The Associated General Contractors of America, Washington, D. C.

tion and Civic Development Department Committee; E. P. Palmer, New York City, is chairman of the committee, and W. A. Klinger, Sioux City, Iowa, is a member.

Private Enterprise

The report of the Market Development Committee adopted by the Governing and Advisory Boards meeting in Chicago, June 28 and 29, 1943, was based upon the principle that the leading part in the future development of the nation shall be undertaken by private enterprise. That principle is based upon the belief that the future development of the Nation by private enterprise offers the greatest opportunities for the Nation, the greatest opportunity for each individual, and the greatest opportunity for the construction industry. Inherent in that principle is the accepting of the responsibility by private enterprise to provide employment for everyone willing and able to work, and

ECONSTRUCTION MARKETS

Scope of Activities to Assure Current and Post-War Work Should Cover National, Regional, and Individual Levels

the conduct of its affairs for the best interests of the country.

The United States Department of Commerce, in a booklet, "Markets After the War", by S. Morris Livingston, reprinted by the Committee for Economic Development, has estimated the volume of work which might be undertaken by various major industries after the war if the nation were developed to a point of high-level employment by private enterprise. In this projection, the volume of construction was estimated at \$17,700,000,000 for the year 1946. In the projection, the volume of private residential construction was set at \$7,000,000,000, a 201 percent increase over 1940; other private construction was set at \$6,700,000,000, a 205 percent increase over 1940; and public construction was set at \$4,000,000,000, a 45 percent increase over 1940. It is doubtful if the industry could depend on government funds to provide anywhere near that volume of construction annually. If for none other than purely selfish reasons, the best interests of construction lie in the complete functioning of private enterprise.

Cooperation With Other Agencies

The Governing and Advisory Boards, at their June 29 meeting, adopted a resolution which pledged the whole-hearted support of the A.G.C. to the objectives of The Committee for Economic Development, and the Market Development Committee in its report recommended to A.G.C. members and chapters joining and cooperating with the C.E.D. locally. The cooperation of the association with the C.E.D., Chambers of Commerce, and other branches and organizations of private enterprise was recommended for a number of reasons.

One reason is that the construction volume is only approximately 10 percent of the total national productive effort at a time when construction markets have been expanded by a high level of national activity, and that at such times approximately 75 percent of the construction market is privately financed—facts which emphasize the dependence of prosperous conditions in construction upon the prosperity of all industry.

Construction, while an important and basic industry, is only a part of the total national economy; it both influences and is influenced by the many factors making up the entire economy. To promote its

self-interest, it has been recognized that construction must cooperate with other industries, with labor and agriculture, to promote the best interests of all. An important factor is that by cooperating with other industries in their planning, confidence in the future can come from learning at first hand of the determination of other industries to go ahead in the future.

Essential Projects Only

As recommended by the Market Development Committee, the association has adopted the principle that it should promote the construction of public and private projects which are undertaken primarily because of a real need for the particular physical improvement or for its general cultural value. The association believes that the future development of the nation offers so many opportunities for useful work that there is no need to waste money and manpower on projects not needed or useful in themselves.

During the '30s a new concept of public works grew up in which projects were undertaken primarily for the amount of employment which they would furnish. The industry believes that this leads to unsound construction, and that in the future there can be enough worthwhile projects to provide all necessary employment in construction. One thing the association cautions against strongly is encouraging the belief that after the war construction will be able to absorb all those who will be unemployed at the cessation of hostilities. This point was stressed particularly by the special committee of the A.G.C. Secretaries Council.

The association believes that the construction industry can and should provide a large volume of employment after the war and that it is ideally constituted to pay a large part in helping to stabilize employment conditions after the war. But it urges strongly that careful thought be given to proposals to stabilize employment by a tremendous volume of public works. To overload the industry for employment's sake alone, and to carry on much of the work by inefficient day-labor methods would tend to destroy for the future the balance between the volume of construction and the volume of other industrial activity, and would upset the proper balance between public and private work by the industry. Because of the effect which the volume of construction has on all other industrial activity,

the association feels that serious thought should be given to the harm which can be done to the nation by overloading the construction industry.

Construction by the Construction Industry

As recommended by the Market Development Committee, the association has adopted the principle that construction work should be performed by all branches of the construction industry. The committee recommended not only that the A.G.C. should continue to promote construction by contractors, but that it should encourage the preparation of plans by qualified architects and engineers. Use of the contract system with its skill, integrity and responsibility was recommended both because it gives the owner the most for his money, and because the expenditure of money through the construction industry provides the maximum stimulation per dollar of other business activity.

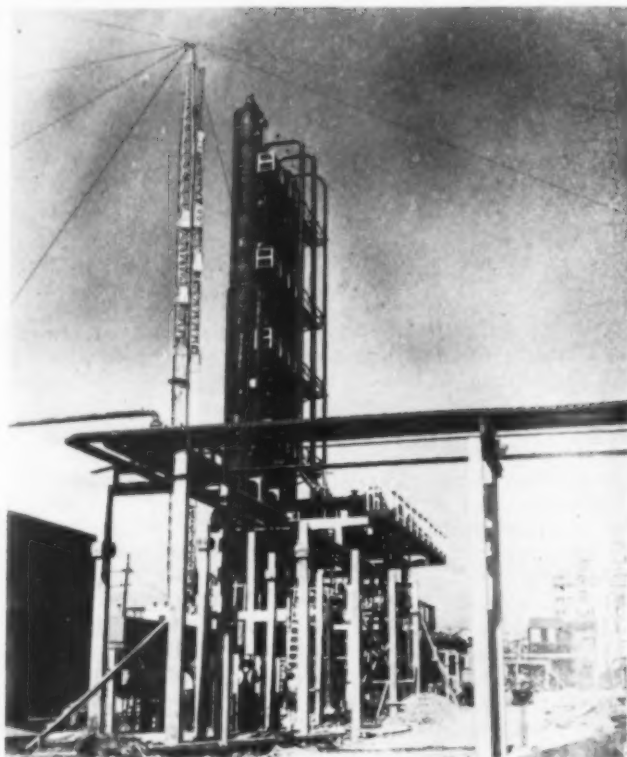
Increase Efficiency

Linked with the principle of construction by contract is the principle recommended by the Market Development Committee that the industry should constantly in-

(Continued on page 124)

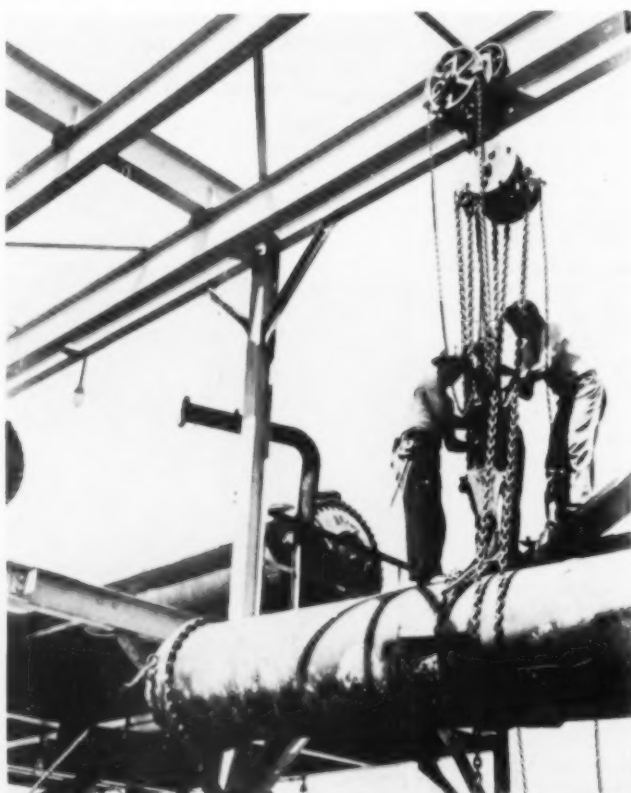


FRED I. ROWE, president of the W. L. Johnson Construction Co., Hicksville, Ohio, is chairman of the Market Development Committee of the Associated General Contractors of America.



GUY DERRICK with 125-ft. mast and 110-ft. boom, rated at 35-ton capacity, raises and sets four lofty towers, more than 100 ft. high, of diolefin unit. Precast concrete supports carry pipe lines in foreground.

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LOW-TEMPERATURE EXCHANGER weighing 9 tons is raised by Reading 10-ton trolley chain hoist rolling on permanent overhead beam. Equipment such as this ammonia exchanger is lifted in bundle bay left open in center of structure in order to provide enough space for pulling tube bundles.

Double Duplication of Original Plant Multiplies

Butyl Rubber Output

By Vincent B. Smith

Associate Editor, Construction Methods

● This is the third and final article of a series, approved for publication by the War Department and the Office of the Rubber Director, telling how four typical plants were rushed to completion as part of the Government's program for producing synthetic rubber at a rate of more than 750,000 long tons per year before the end of 1943.



ISO-BUTYLENE SECTIONS of butyl rubber plants No. 2 and No. 3 produce iso-butylene which later is used in polymerization sections to make butyl rubber. Vessels and piping comprise most of process equipment for butyl rubber units. Tall towers erected by guy derrick in background are part of unit which produces minor secondary feed stock (diolefin) for both butyl rubber process lines.

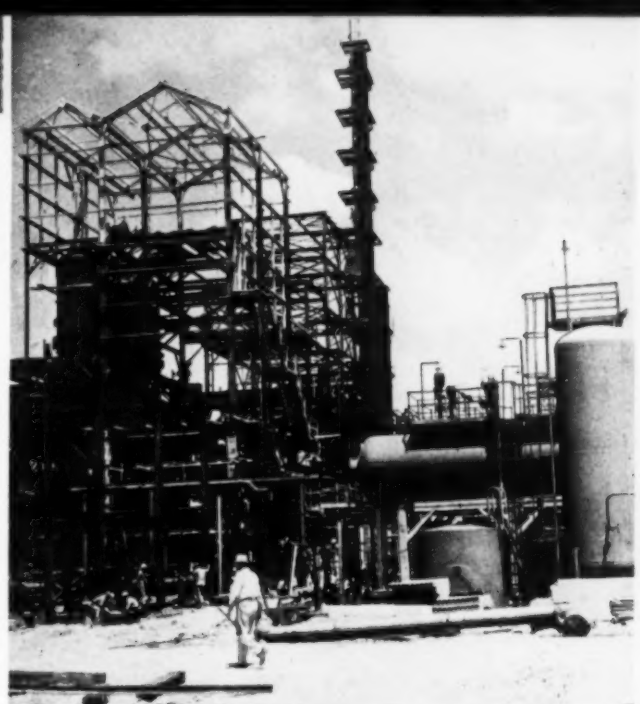
BUTYL RUBBER HAS BEEN PRODUCED since the first of the year at a plant on which construction was started in December, 1941, for the Standard Oil Co. of Louisiana by the Stone & Webster Engineering Corp., Boston. The Government has taken over this plant, which has a capacity of 7,000 long tons a year, and the oil company operates it for the Rubber Reserve Co. Two additional Government-owned units, practically duplicating the first in process design but providing twice the capacity per unit, have been under construction by the same general contractor alongside the original plant for the Defense Plant Corp. since February, 1942, and these plants will begin production of butyl rubber in the late summer and early fall, one starting operation in advance of the other. The double duplication (with some modifications) will increase to 35,000 tons the output from Baton Rouge, La., of butyl rubber, an extremely stable product not subject to oxidation or deterioration under attack by acids.

Butyl rubber is made by polymerization (linking or grouping of the molecules) of iso-butylene with a small amount of isoprene. All operations of processing the feed stocks and finishing the product ready for shipment are integrated in compact plants. The original unit, now operating, contains all facilities for the complete process. In the two new plants, coordinated for more economical production, certain functions such as preparation of secondary feed stock and finishing of the rubber are centralized in common departments serving both processing units.

Butyl Rubber Process—As an introduction to design features of the plant, a brief description of the butyl rubber process may be helpful. Iso-butylene, the primary feed stock from which butyl rubber is made, is prepared for processing by extracting it from a stream containing iso-butylene in an extraction section.

A second feed stock used in small amount in the process is a diolefin prepared in a separate extraction unit. Both feed stocks are delivered to a reactor unit where the actual poly-

TYPICAL RIVETED STRUCTURAL FRAME (below) is erected to carry drums and other equipment of polymerization section for butyl plant No. 2. After all structural connections have been completed, load-bearing members will be fireproofed.

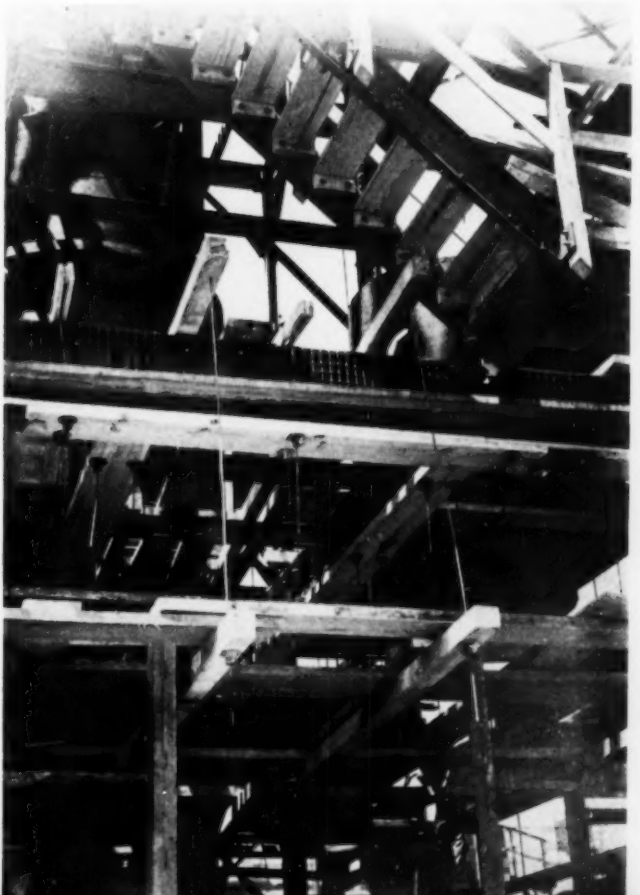


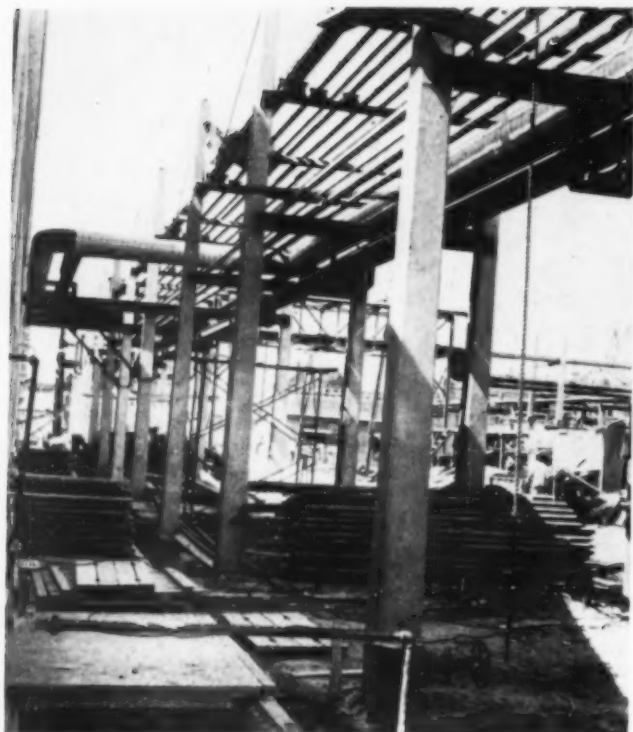
FRACTIONATING STRUCTURE with 120-ft. tower looms large in background of this polymerization section for butyl rubber plant No. 2. Two drums have been set in steel frame at left. Drum and pump unit appears at right.



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SOFFIT FORMS and scaffolds suspended from steel beams are used in fireproofing structural frame of polymerization unit. Wherever substitution can be safely made, wood is used in place of steel for stairs, platforms and handrail.





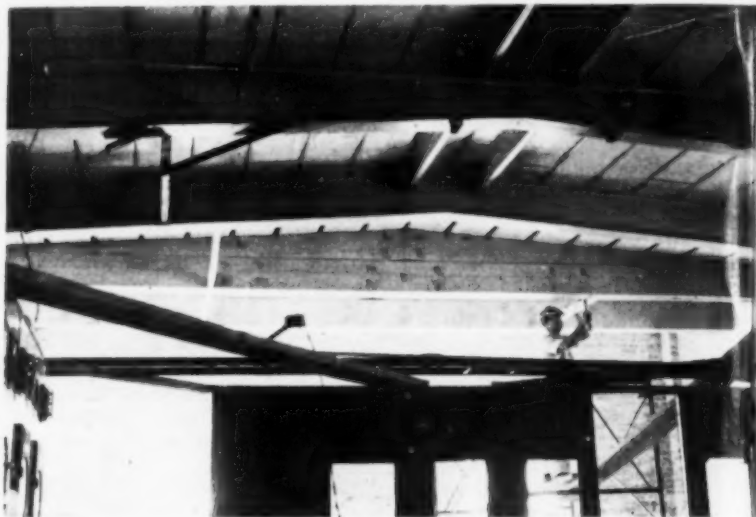
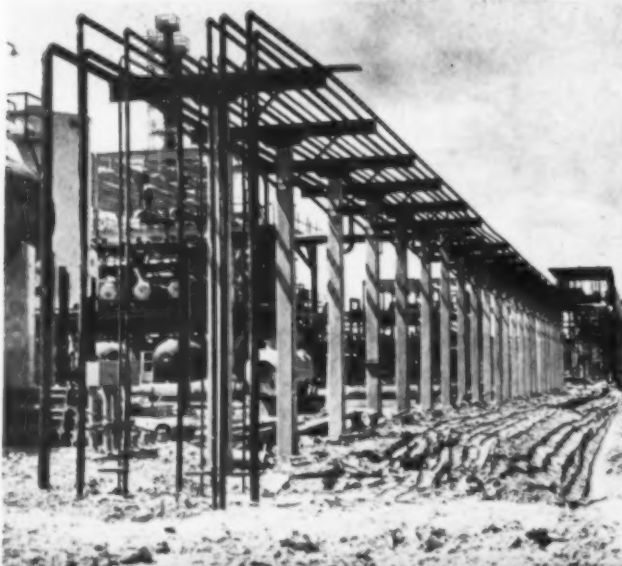
PRECAST CONCRETE SUPPORTS with metal crossarms and intermediate hangers carry pipe band in front of finishing building for two butyl rubber plants.

SEPARATE WOODEN LEG (right) used by water boys as temporary rest for 5-gal. container filled with cold water eases work of lugging these tanks about job. After helping himself to salt tablets and paper cups, supplied with all containers. **WILLIAM A. ROMANS**, office engineer, Sione & Webster Engineering Corp., draws a drink.



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SINGLE LINE of precast concrete posts (below) capped by steel cross-arms carries band of small-diameter pipes.



BUILT-UP TIMBER BEAMS replace steel roof beams carrying gypsum plank decking in expansion of control house for polymerization section of butyl plant No. 2. Carpenter on scaffold is installing wood hangers for lights.

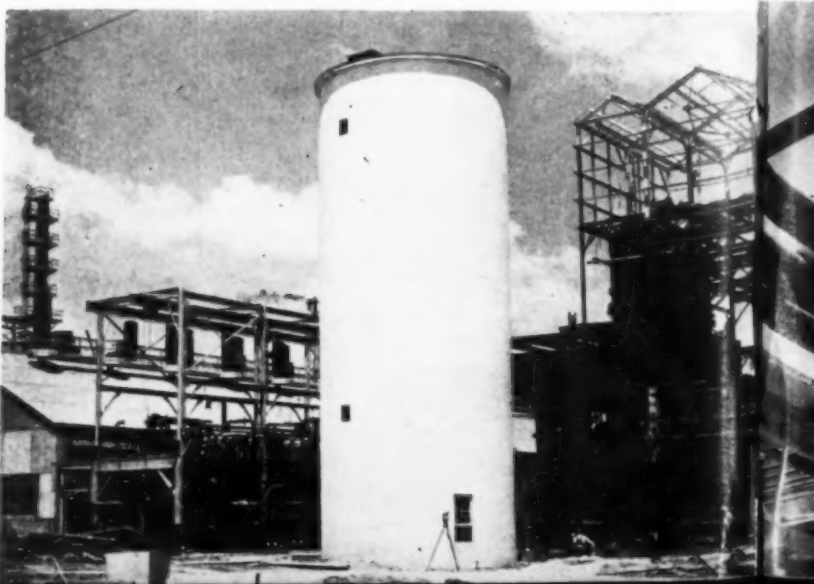
merization takes place. Prior to polymerization, the feed stocks are further purified to an extremely high degree of purity and are mixed with a diluent. The mixture is refrigerated, and a catalyst is added. At this point, a slurry of rubber is produced in the solution.

This slurry of rubber in solution is converted to a water slurry in outside equipment. Pumps and pipe lines deliver the water slurry to the finishing building, where the product is dried and milled in sheets, ready for packaging and shipment.

Design Features—Like the styrene and butadiene plants already described, the butyl rubber project involved a huge installation of process equipment and piping. Structural framing in the process lines was constructed of steel in accordance with the original designs prepared for the first butyl rubber unit, this use of steel being favored in preference to suffering a delay which would have been necessary if a redesign in wood had been ordered. Structural shapes for the job were readily procurable.

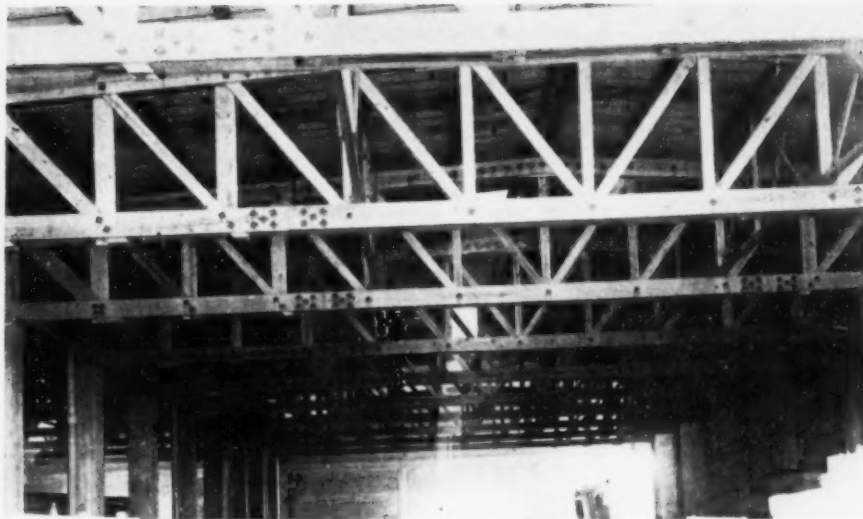
In line with the usual practice of the Standard Oil Co. of Louisiana, all steel-frame structures in the process lines are

REINFORCED-CONCRETE SILO for carbon black storage is erected with sliding forms by Nicholson Co., subcontractor, New York. At left is compressor house with outside manifold and equipment supports.





AGITATOR TRUCK uses rear discharge to fill wheelbarrows transporting concrete for small pour. Bath-tub bodies can also discharge at side.



ALTERED DESIGN for expanded finishing and storage building replaces structural steel framing with concrete columns and timber roof trusses, 8 ft. deep, of 58-ft. span. Gypsum roof deck rests on wooden purlins supported by roof trusses. Split-ring connectors are used in framing timber trusses.

fireproofed with a minimum of 2 in. of concrete up to the level where they support equipment loads. Substitutions were made for structural steel wherever practicable. In the diolefin unit, for example, which was an addition to the original process design of the first butyl rubber plant, the frame supporting the tall extraction towers was constructed of reinforced concrete. On these towers and elsewhere throughout the two new plants, wood was substituted for steel in platforms, stairs and ladders except in those places where use of wood presented a hazard.

In general appearance, the three butyl rubber units make up an establishment which closely resembles an oil refinery. Most of the equipment is out in the open. The only large sections completely inclosed are the compressor houses and the finishing buildings. Refrigeration systems are partially inclosed to prevent rainwater from striking and freezing on the low-temperature piping.

For the compressor house and finishing building serving the second and third butyl rubber units, the standard design was followed, using steel framing, with corrugated asbestos-cement sheets for roofing and siding. In an expansion of the finishing

(Continued on page 116)

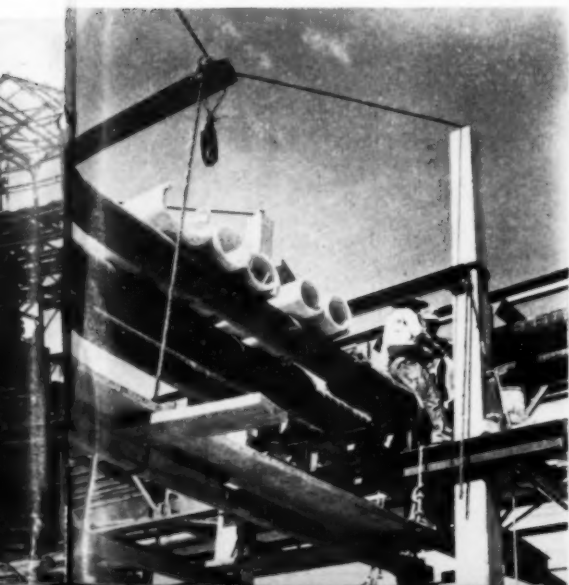


FRAME OF REINFORCED CONCRETE supports second floor and roof trusses to be erected in two-story storage section at one end of expanded finishing and storage building. In foreground may be seen reinforcing bars protruding from concrete footings on top of creosoted timber piles driven in expectation that building expansion would cover larger area. Size of building was decreased after Government rubber program had been reduced.

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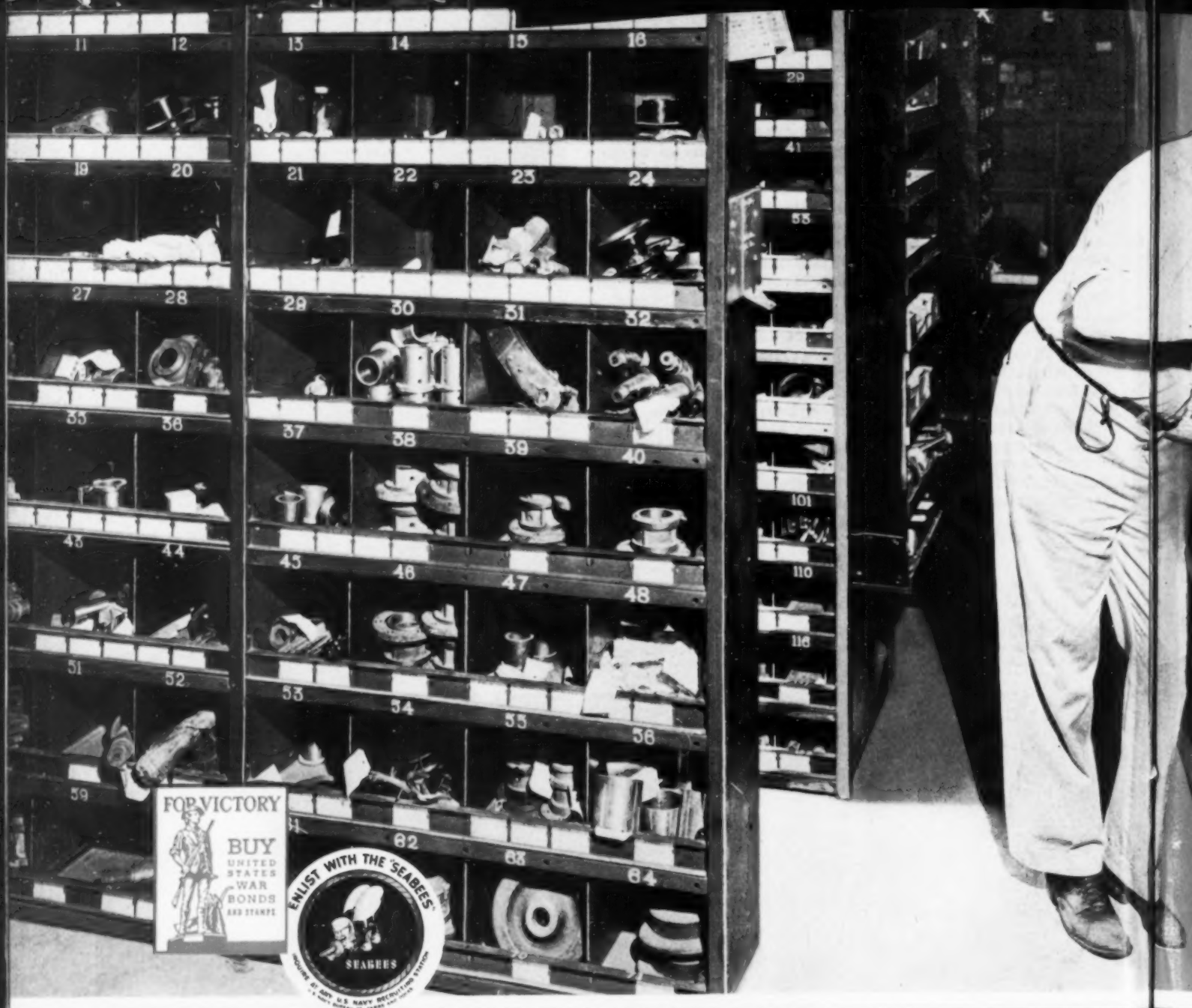
HOT PIPES of overhead process lines are insulated by workmen using hanging scaffolds between pre-cast concrete bents.

A-FRAME BENT (below) stiffens pipe band against longitudinal movement at approach to steel truss bridge carrying overhead lines across road. Pipe of various descriptions used in project amounted to 309 carloads.



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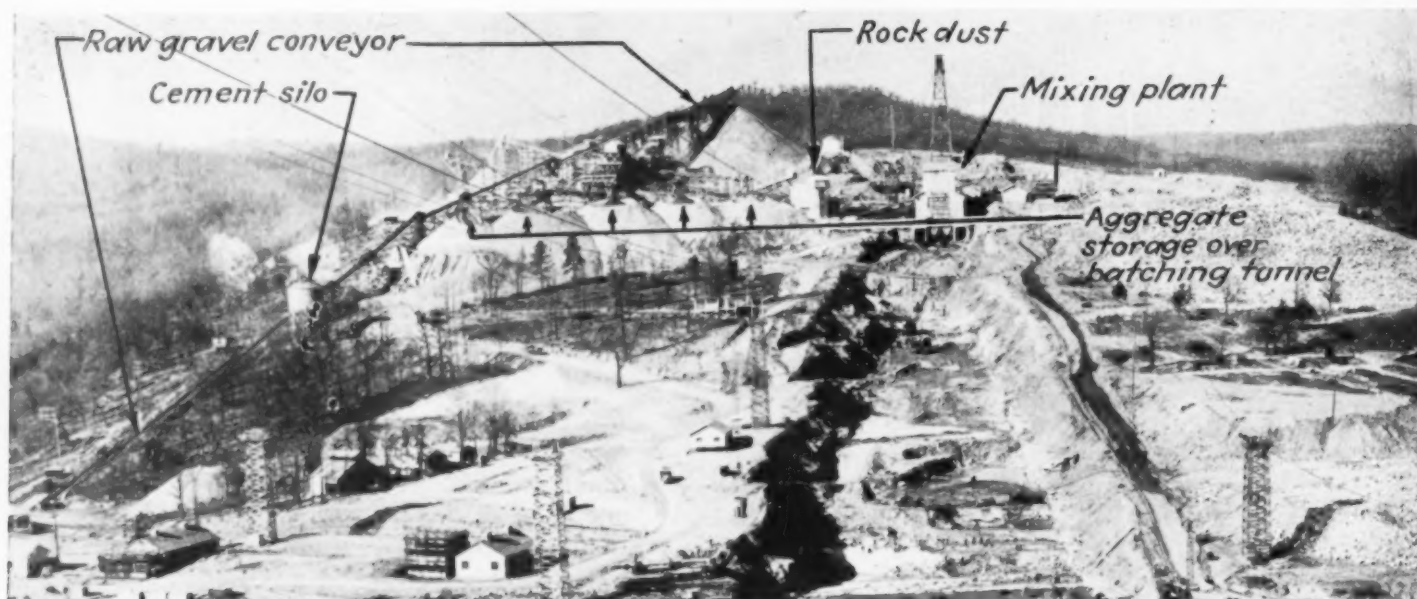
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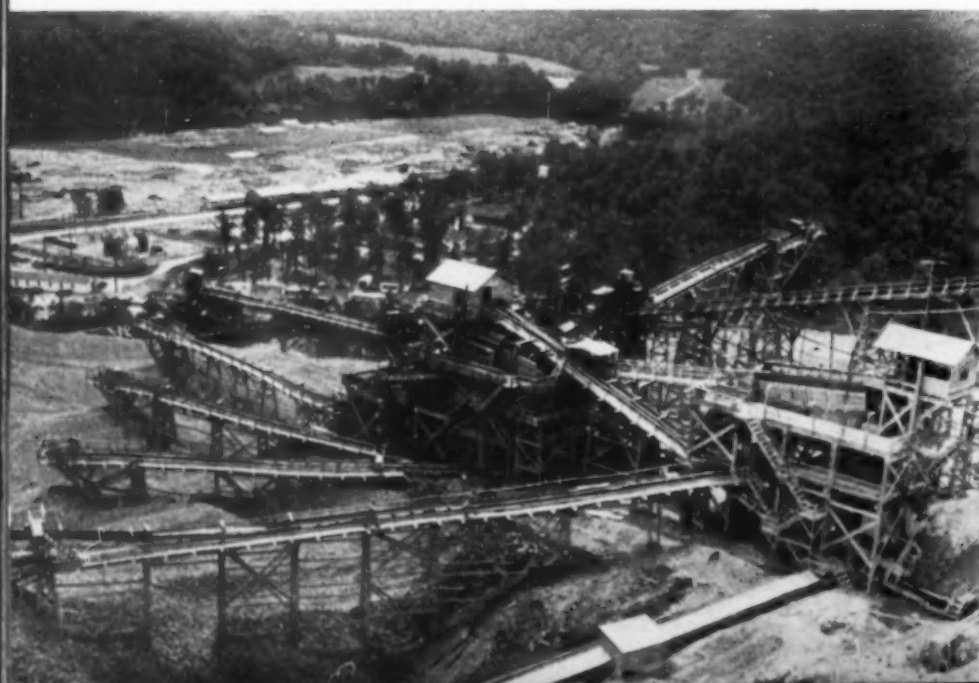


GRAVEL CONVEYOR 1,352 ft. long, comprising seven flights of 42-in. belt, delivers raw material from track hopper to storage pile at top of slope. Classified aggregates made from gravel and rock by crushing and screening plant are stored in separate stockpiles over batching tunnel. Belt conveyor runs from batching tunnel to mixing plant. Cement silo for reserve storage is located at intermediate point on air-activated cement conveying system, between railroad unloading point and mixing plant.



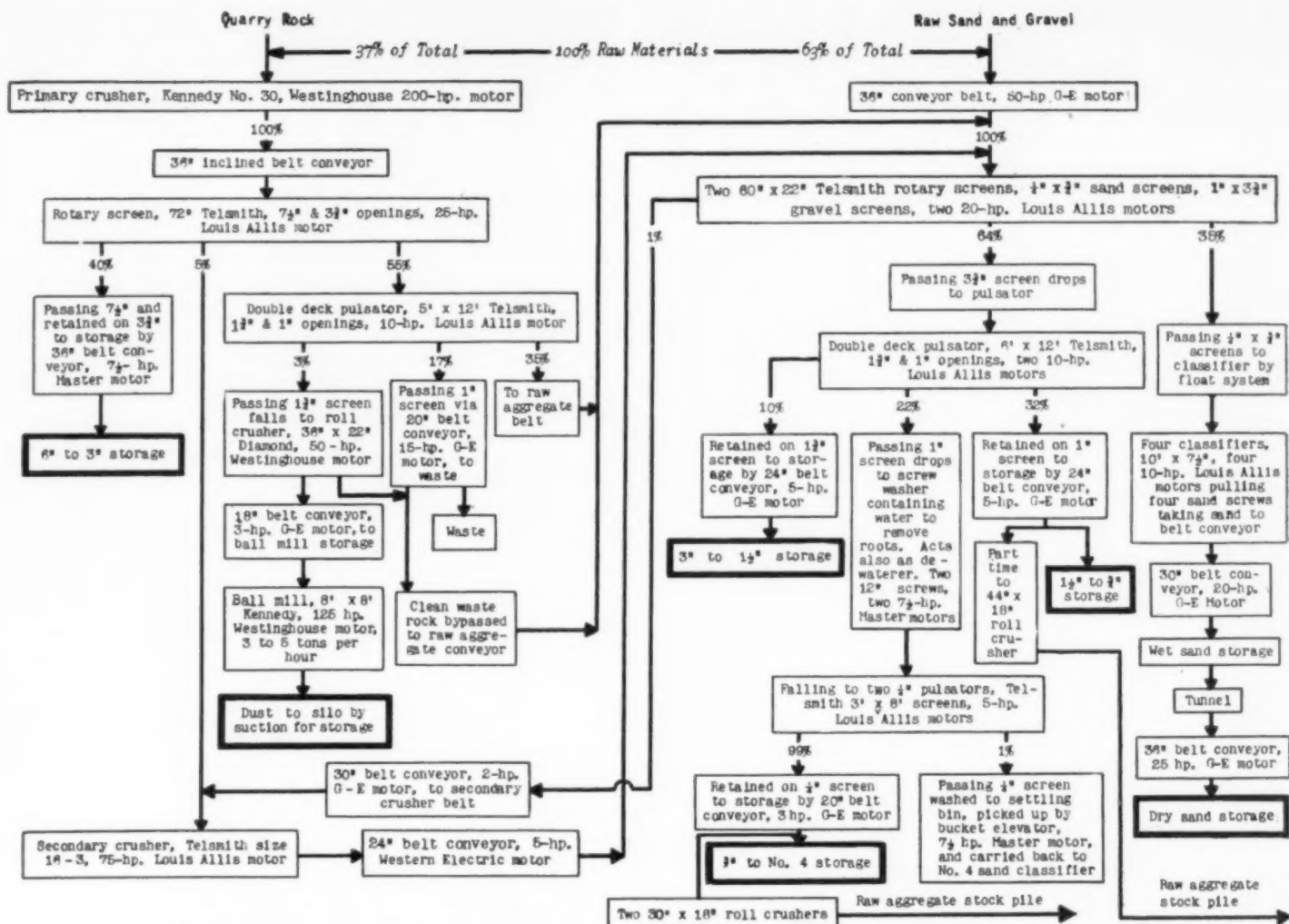
RAW SAND AND GRAVEL drop from discharge end of seven-flight conveyor at elevation 335 ft. above track hopper where railroad cars unload material.

Coordinated Plant Crushes, Screens and Batches Concrete Materials for Norfolk Dam



RIVER GRAVEL AND QUARRY ROCK furnish the raw materials for aggregates used in 1,500,000 cu.yd. of concrete at Norfolk Dam, U. S. Engineer project being built by The Utah Construction Co. and Morrison-Knudsen Co., Inc., contractors, on the North Fork River in Arkansas. Gravel and sand, available in gravel bars of the White River, into which the North Fork flows 5 mi. below the dam, are economical raw materials for the production of aggregates in sizes up to 3 in., but rock is needed for the largest classification, 3 to 6 in., and for the dust which

ELABORATE SYSTEM (left) of belt conveyors handles materials at crushing and screening plant producing five sizes of aggregates and rock dust for 1,500,000 cu.yd. of concrete required by Norfolk Dam.



FLOW CHART of coordinated crushing and screening plant shows how processing lines for two kinds of raw materials, gravel and blasted rock, are combined to produce five sizes of concrete aggregates, plus rock dust. Both primary and secondary crushers are gyratory type. Screw washers, sand classifiers and two 30x18-in. roll crushers are Tel-smith units; 44x18-in. roll crusher is Webb City.

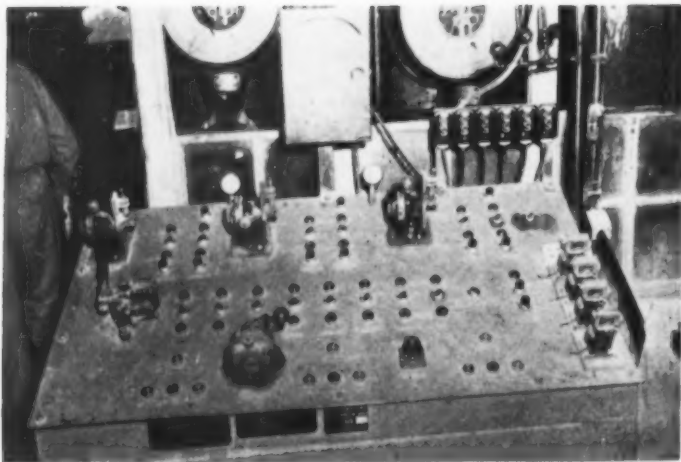
Layout of the contractors' plant and elevations and cross-sections of Norfolk Dam appeared in an article last month, *Construction Methods*, October, 1943, p. 62.

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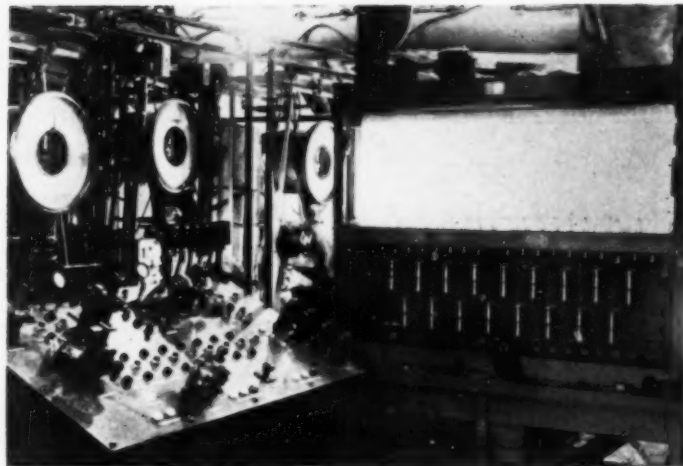
BLASTED ROCK (below) from quarry is dumped by truck into primary crusher which discharges crushed rock to belt conveyor on near side. Crusher platform is screened to permit blasting oversize chunks of rock inside this cage.

2 1/2-YD. SHOVEL at quarry loads blasted limestone into 10-yd. trucks for delivery to primary crusher shown in photograph at left.





BATCHING PANEL in mixing plant is equipped with colored signal lights and pushbuttons to facilitate complete control by operator of six batchers in tunnel. Five levers on panel control charging and discharging of three concrete mixers.



AUTOGRAPHIC RECORDER in operator's control room in mixing plant makes complete graphic record of all batch weights and time of each batching operation on moving sheet of paper. At left are weigh scales for measuring cement and water for each concrete batch.



AUTOMATIC WEIGHING BATCHERS in batching tunnel measure out five sizes of aggregate and rock dust for delivery by belt conveyor to concrete mixing plant.

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is added to the concrete to improve workability.

To provide four classes of coarse aggregate, in addition to fine aggregate and pulverized rock, from the two kinds of raw materials, the contractors employ a coordinated plant comprising two correlated processing systems, one designed to make 3-to-6-in. aggregate and rock dust out of blasted limestone, the other to produce sand and three sizes of coarse aggregate from raw gravel material plus rock in intermediate sizes transferred from the other line. As shown by an accompanying flow chart, the two systems are interconnected by conveyors which transfer intermediate-size rock and oversize gravel from the one processing line to the other. By this coordination of the two systems, raw materials are utilized to the greatest extent possible, and waste is reduced to a minimum.

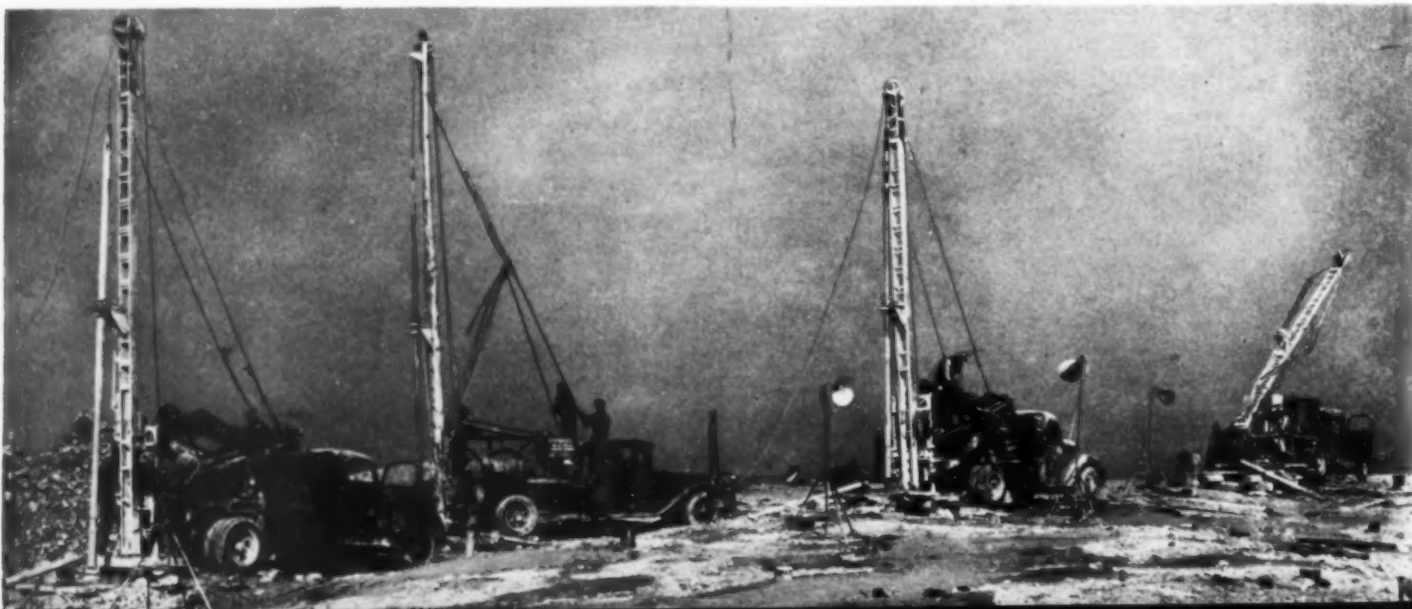
Slightly more than 60 percent of the raw material comes out of gravel bars in the White River. Gravel and sand are loaded by draglines out of the river into railroad hopper cars which transport the material 10 to 20 mi. from the bar to the

job. Rock is blasted out of a limestone quarry within 2 mi. of the plant and is hauled to the primary crusher in 10-yd. trucks. For concreting at an average rate of 2,500 cu.yd. per day, the plant requires about 3,000 tons of gravel and 2,000 tons of rock every 24 hr. At times, the consumption rises to almost twice this daily amount.

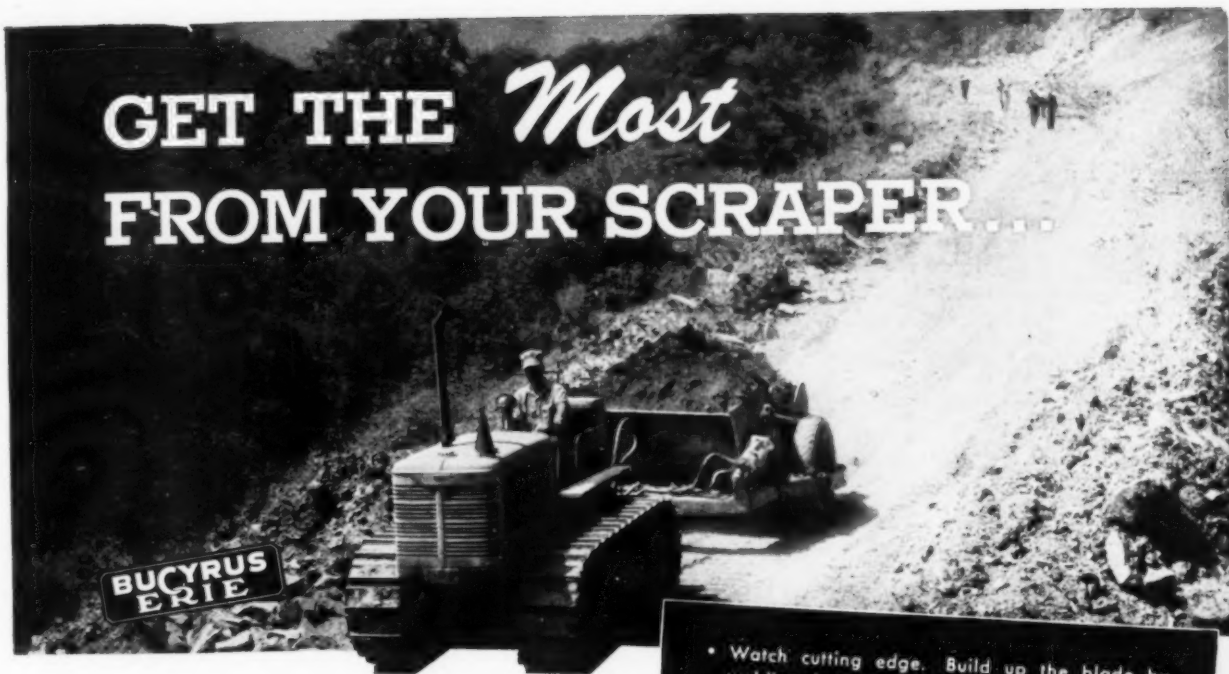
Gravel Processing—Gravel raw material dumped from the railroad cars into a receiving hopper is carried up hill by a seven-flight, 42-in. belt conveyor, 1,352 ft. long, which deposits the material in a raw storage pile at 335-ft. higher elevation over a tunnel 9½ ft. high and nearly 260 ft. in length. A 36-in. by 410-ft. conveyor picks up the raw material in this tunnel and carries it to the rotary screen noted on the flow chart. Sand goes through classifiers to wet sand storage over a tunnel 8 ft. high by 190 ft. long. After draining, the sand is discharged in this tunnel on to a 36-in. by 260-ft. belt which delivers to dry sand storage over a batching tunnel. Three sizes of coarse aggregate, as noted on the flow chart.

(Continued on page 136)

FOUR CHURN DRILLS (below) mounted on trucks sink 6¼-in. holes at quarry to be loaded with 5-in.-dia. dynamite cartridges. Holes are connected and fired by detonating fuse.



GET THE *Most* FROM YOUR SCRAPER...



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- Watch cutting edge. Build up the blade by welding before it wears to the point where supporting casting is damaged.
- Keep leverage mechanism and pivot pins clean and in proper adjustment for freedom of action in bowl.
- Set apron opening at correct position for the type of soil which is being loaded.
- Make certain that same adjustment of bowl stop is used on both left and right sides to avoid twisting of bowl.
- Check condition of draw-bar pin and safety cable.
- Hydraulic system check-up should be regular routine. Make certain that oil is up to level and system is clear of air.
- Drain the oil when it is dirty. Floating particles wear the pump and valve.
- Keep all hose and pipe connections tight to prevent loss of oil and infiltration of air.
- Have an adequate schedule for lubricating at high-pressure fittings.
- See that all nuts, bolts and cotter pins are in place and tight. Keep tires properly inflated.

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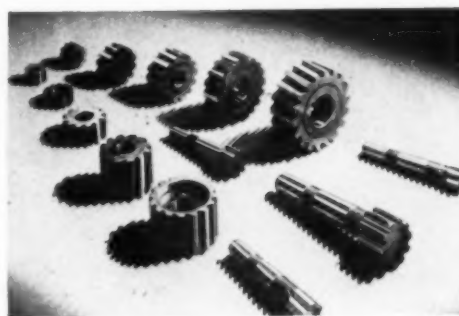
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CONSTRUCTION EQUIPMENT NEWS

NOVEMBER, 1943, REVIEW of Construction Machinery and Materials

THREAD MILLING CUTTERS in standard sizes have been developed to speed delivery and simplify ordering. Sizes selected for standardization were chosen after survey to determine most widely used cutter types and sizes and thread milling equipment used in industry. To place an order, it is only necessary to specify blank number and thread specifications desired. Blanks are then taken from stock and threads ground to individual specifications. Included in line are both shell and shank type cutters. Diameter range is from 1 1/2 in. to 3 1/2 in. Face widths vary from 1/2 in. to 2 in. and hole sizes correspond to standard thread milling machine arbors. Both types of blanks have right-hand spiral flutes and 5-deg. rake angle. Twelve different shank type blanks are carried in stock, from 3/4 to 1 1/2 in. in diameter.—**Detroit Tap & Tool Co., 8432 Butler St., Detroit (11), Mich.**



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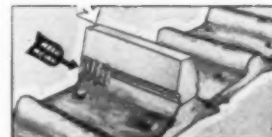
TRAILBUILDER has power control unit to govern action of blade which assures smooth, positive action, full visibility, and minimum cable stress. Sturdy side arms hold blade rigidly in position. Cutting edges are of specially treated alloy steel and are removable as well as reversible. Adjustable mushroom grading shoes are available as



special equipment on either type of blade and are readily replaceable. Unit is mounted so that center of gravity of equipment is as close as possible to center of gravity of tractor. Positive locking pin with double-acting design makes it possible for one man easily to make all end tilt adjustments without use of jacks or sledges. Design provides choice of two side push arm pivot points for adjustment to increase or decrease effective cutting blade penetration. Blade cuts at closely variable depths with no washboarding or gouging. Its drop below ground is unlimited and it may be raised to 55 in. above ground.—**Heil Co., Milwaukee, Wis.**



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HELP TO PREPARE FOR THE BIG PUSH NORTHWARD



FROM AUSTRALIA

ALMOST DAILY we read of the exploits of allied forces in the recapture of Jap strongholds in the islands of the Southwest Pacific. These, of course, are but the "openers" of the big northern push towards Tokyo . . . To sustain this push it has been necessary to convert Australia into a big armed camp used as the base for tremendous forces of troops and quantities of materiel. This has called for the construction of many army camps, military roads and air fields. In this big construction pro-

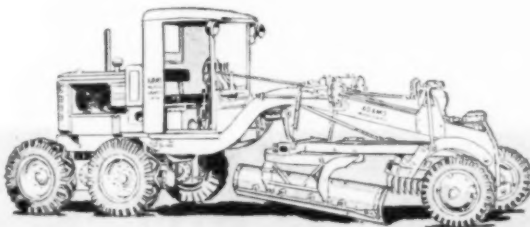
gram Adams graders have had an important part . . . In many other parts of the world—in Alaska and the Aleutians, in England, in Africa, Sicily and the Near East, in Central and South America—Adams equipment builds facilities for the successful prosecution of the war . . . When peace comes, turn to your Adams dealer for tried and proven equipment.

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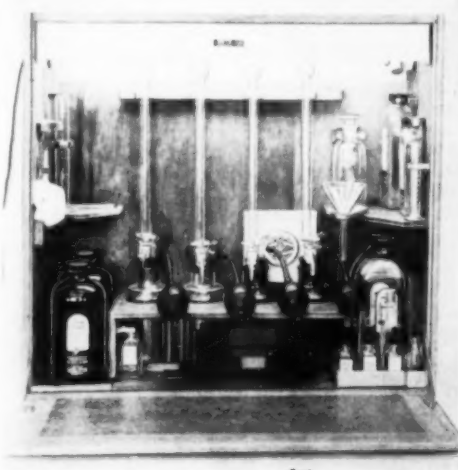
REDUCTION DRIVE GEAR is said to be highest capacity right-angle gear ever produced by generating process. Gear and pinion were produced on standard Cone-Drive generating machines, with



backlash held in production to maximum of .003 to .005 in. Reduction ratio of gearset is 192 to one, while pinion diameter is 7 in. This 97.5 in. O.D. Cone-Drive gear is equivalent in capacity to 161 in. O.D. worm gear.—Michigan Tool Co., Detroit, Mich.

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of opened cabinet door forms convenient acid-resistant laboratory work table and fluorescent light provides correct illumination for tests. Protection afforded by cabinet minimizes breakage and eliminates errors caused by dust and dirt.—W. H. & L. D. Betz, Gillingham and Worth Sts., Frankford, Philadelphia, Pa.



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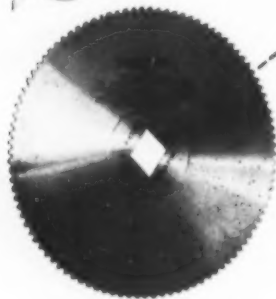
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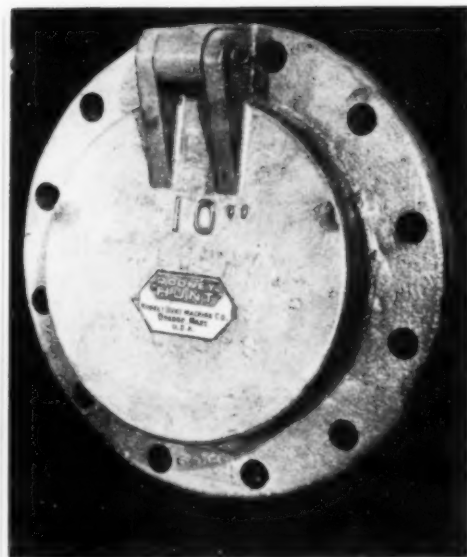
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FLAP VALVE of exceptional strength is extremely shallow in depth for use in floating dry docks. Design prevents unit from protruding into water and thus interfering with passing ships. Was built for salt water service.—Rodney Hunt Machine Co., Orange, Mass.

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FLOOR PATCHING MATERIAL, known as Emeri-Crete, is intended for use in filling cracks, small depressions, ruts, or other imperfections and inequalities in concrete or cement floors. Small particles of emery are mixed with special quick-setting binder which permits use of floor in 6 or 7 hr. after repair has been made. Is packed in small packages permitting use of just right amount of material to do job at hand without waste. Maker claims patches will not stretch, have great adhesive properties and will make repairs permanent.—Walter Maquire Co., Inc., 330 W. 42nd St., New York (18), N. Y.

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HARDENED-SHANK REAMERS with carbide tips are characterized by great strength and reduced shank wear. New standard line includes straight shank and tapered shank varieties, with sizes ranging from 1/4 in. to 1 1/2 in. in both styles. Up to



1 in., reamers come in steps of 1/32 in., while above 1 in., diameters change by 1/16 in. Reamers up to 1/2 in. have four flutes, with 6 flutes for reamers from 1/2 to 13/16 in. inclusive, and 8 flutes for all larger sizes. All tips are diamond ground, ready to use, and O.D. is held to tolerances of plus 0 and minus .0003 in.—Tungsten Carbide Tool Co., 2661 Joy Road, Detroit (6), Mich.



Official U. S. Army Signal Corps Photograph

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lubricants give *safe* lubrication . . . keep equipment
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in continuous operation.

(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)

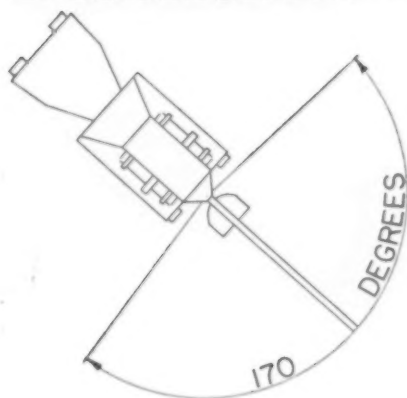


SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK 20, N. Y.

November 1943 — CONSTRUCTION METHODS — Page 87

Ransome 34-E DUAL DRUM PAVERS



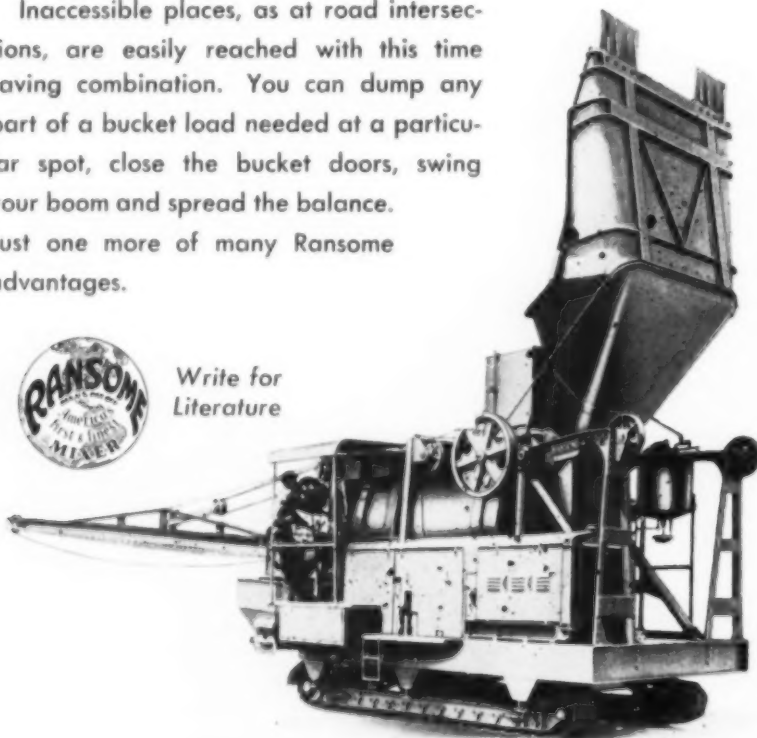
A
boom swing
of 170 degrees

COMBINE a boom swing of 170 degrees with the Ransome hydraulically operated bucket, permitting swinging and spreading simultaneously, and you've got a batch distributing combination that's hard to beat.

Inaccessible places, as at road intersections, are easily reached with this time saving combination. You can dump any part of a bucket load needed at a particular spot, close the bucket doors, swing your boom and spread the balance. Just one more of many Ransome advantages.



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Literature



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MACHINERY COMPANY
DUNELLEN . . . NEW JERSEY

A Subsidiary of Worthington Pump & Machinery Corporation

SQUIRREL-CAGE INDUCTION MOTOR is fully protected against flying chips, falling particles, dripping liquids, and other industrial motor hazards. Is constructed with centrifugally-cast F-M Copper-spun Rotor. Ball bearings sealed in cartridge-type housings minimize expensive shut-downs due to



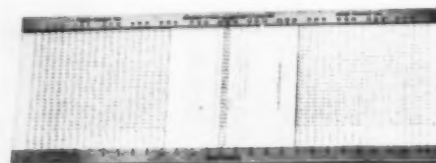
bearing failures. Cross-flow ventilation is obtained through protected inlets and exhausts at each end of motor. Absence of moving external parts insures safety for operator. Frame is cast in one piece with rib sections to give added strength without increase in weight. Where space is limited, conduit can be brought up between motor feet to tapped hole in motor frame and conduit box cover assembled flush with frame. External box is then discarded. When conventional conduit box is used, it can be mounted in any of four positions. —Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

★ ★ ★

HIGH-SPEED PRINTER, using new mercury-vapor quartz lamp, produces prints of engineering plans 100 times more rapidly than is possible with ordinary light. Prints are direct positive black and white copies of kind that are supplanting blue-prints. New light tube with which high speed is obtained is equivalent to six to eight powerful carbon arc lamps. —Charles Bruning Co., Inc., 102 Reade St., New York City.

★ ★ ★

PAYROLL CALCULATOR facilitates overtime as well as straight payroll calculations. Forty hours plus overtime are calculated in one operation on one side of device for firms that require total pay-check only. Reverse side is used for figuring



straight time and overtime as separate items. All hourly rates of pay from 40c. to \$1.74 with 1/2-c. spread between rates and time periods up to 80 hr. with divisions of tenths and quarters are covered. New model is made of tempered masonite and lacquered wood. —Berger-Brickner Co., 433 S. Spring St., Los Angeles (13), Calif.

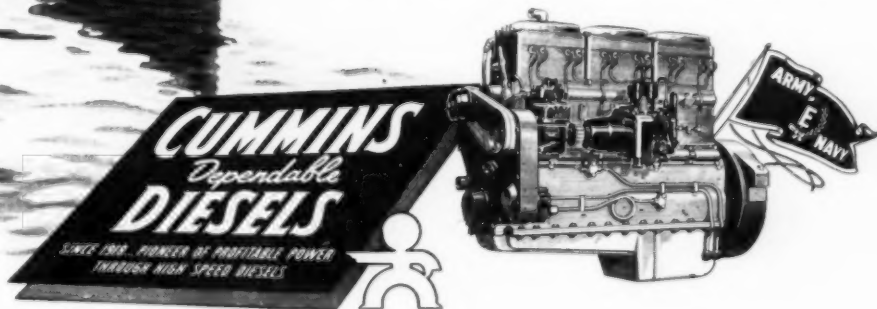
This Fuel Conservation started 15 years ago !

The principle of Fuel Conservation is to eliminate waste without sacrificing any vital need. For example:

In 1928, fire protection for its harbor was a vital need at Portland, Maine, but natural New England thrift rebelled against paying for fuel which would be consumed in idleness . . . in merely keeping up steam to assure having fire protection when it was demanded. After a thorough investigation, the fire boat, City of Portland, was ordered and Cummins Diesel power was chosen for three reasons: *First*, the Cummins Diesel's proved easy starting made certain that the boat would be ready to go any time, day or night. *Second*, the engine's compact size and light weight per horsepower made it an ideal plant for fire pumps and main propulsion. *Third*, the Cummins Diesel's recognized fuel economy and low maintenance assured a low operating cost.

In 15 years of duty on Portland's water front, and in comparable terms of service in fire boats at Chicago and Ketchikan, Alaska, Cummins Diesels have consistently demonstrated their ability to provide maximum protection at a minimum cost in dollars, manpower and fuel.

Such economy—multiplied by the many thousands of Cummins Diesels doing scores of jobs essential to a nation at war—becomes doubly valuable now when every dollar and every man and every drop of fuel is so vitally needed to push the fight on the battle front and the home front. CUMMINS ENGINE COMPANY, Columbus, Indiana.





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With this Hetherington & Berner plant, Dale Engineering Co. (Utica, Syracuse and Rochester, N. Y.) averaged 100 tons of tar concrete per hour—every hour—on a road construction job at the big Naval Training Station at Sampson, New York. When the work day was lengthened from 10 to 12 hours, the daily production was boosted to 1,300 tons. Four black top paving machines were kept busy handling the output of this one plant.

This production is typical of the way in which H & B plants are helping speed the construction and maintenance of roads and bases that are vital to Victory. Write for complete information on H & B portable and stationary asphalt plants.

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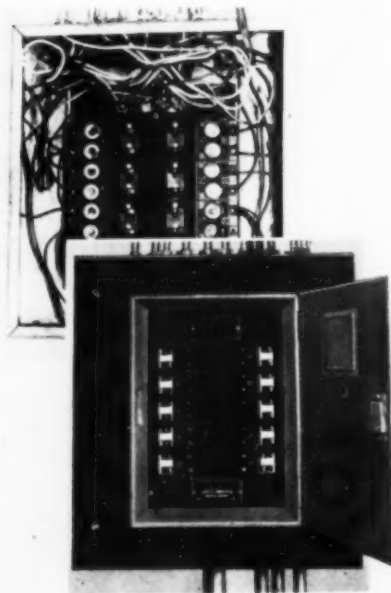
ALTERNATING CURRENT WELDER is specially designed for use in shipyards and other outdoor locations where exposure to weather is encountered.

Has welding current range from 100 to 625 amp. at 40 v. "Idlematic" control automatically reduces output voltage to less than 35 v. whenever arc is not in operation but provides full power for welding the instant arc is struck. Control also includes switch operated by handle extending through top of case for starting or stopping welder manually. Is protected against entrance of snow, rain, and sleet by drip-proof construction of all openings in top of case and by sealed window over current indicator. Wide louvers serve to shed water and keep air velocity low. All internal parts have special finish for protection against corrosion from moist air. Built-in power-factor improvement provides low current input by maintaining power factor at 95 percent or better at all loads between 40 and 70 percent of rating. Other features include finger-tip adjustment, stepless current control, fan-forced ventilation, and capacity for operation with long leads.—General Electric Co., Schenectady, N. Y.



★ ★ ★

CONVERTIBLE PANEL PLAN provides for complete conversion of obsolete fusible panel-boards to circuit breakers with considerable increase in number of circuits, as well as in circuit and main capacities.



Average increase in capacity of existing panel-boards is between 50 and 100 percent. Under Square D Plan, conversion is relatively simple. Old trim and interior are removed from box and existing wiring pulled out if it cannot be utilized. By employing thin-wall wire, existing conduit may be wholly or partially used. Ingeniously designed trim completes new installation.—Square D Co., 6060 Rivard St., Detroit, Mich.

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You get top notch performance from your air tools when you team them up with Thor Accessories. Made from the highest grade tool steel, precisely hardened and tempered by instrument-controlled forging and heat-treating machines, Thor Accessories are "tested for toughness" on specially developed machines.

For additional information on Thor Accessories, use the coupon below.



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BOTTOM-DUMP TRAILER WAGON is 36 ft. long, weighs 34,000 lb., and is capable of hauling load of 25 tons. New clamshell type bottom-dump doors swing up alongside hopper. Doors, operated by



power-driven cable, flash open in two seconds and when they are open, vehicle has more clearance than before it dumped. Doors close automatically by gravity and lock when back in position.—Heil Co., Milwaukee, Wis.

★ ★ ★

NONCUMBUSTIBLE ABSORBENT has been developed for reducing fire and slipping hazards and for cleaning floors. Is non-abrasive and will not damage machinery or working parts due to abrasive action. Is odorless, non-poisonous, and non-injurious to skin, clothing, or flooring. May be spread by hand and used on any type of floor surface. Absorbs up to 45 or 50 percent of oil or grease by weight.—Fidelity Chemical Products Corp., 430 Riverside Ave., Newark, N. J.

★ ★ ★

PAINT BRUSH CLEANER, known as Prestorer, prolongs lives of brushes now in service and restores to service brushes that have become hard and useless through neglect. When immersed in solution, according to manufacturer, recently used brushes become clean in few hours, while old and



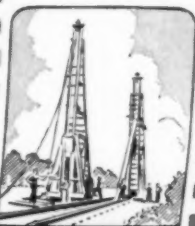
tough ones cleanse themselves in from 12 to 96 hr. Contains no high powered caustic alkalis and is non-inflammable. Solution is absorbed into bristles by capillary action and bristles swell, causing hard paint pigment to crack off. After drying swelling disappears and bristle returns to normal size without injury. Since pigment is not dissolved, solution may be strained through cheese cloth and kept clean for use over and over again.—Technical Development Laboratories, Tenaflly, N. J.

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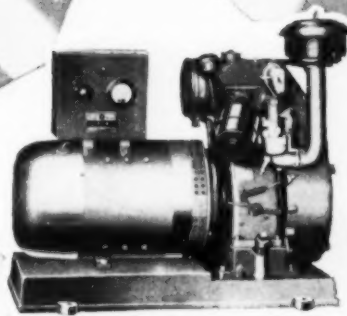
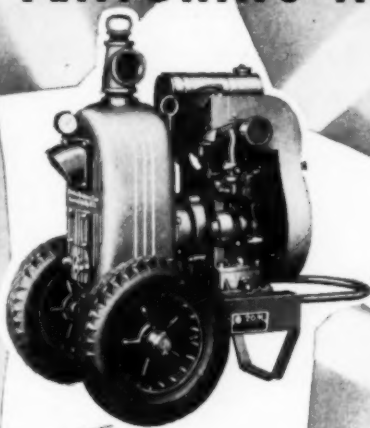
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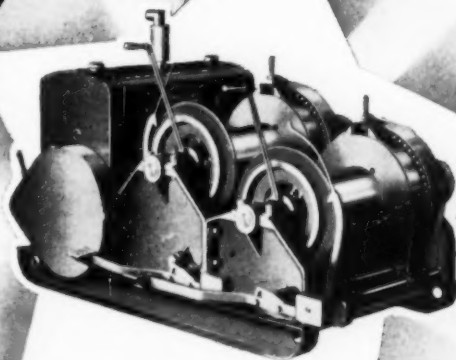


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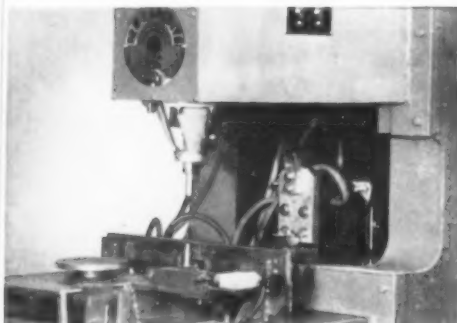
Haiss Hi-Power has the brute strength for heavy digging, and the power in its bite to yank loose an embedded boulder. Weight and closing power combine to dig deep and tear out a heaping bowlful at every grab. Alloy steel parts for abrasion resistance, long bearings for longer wear.

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RESISTANCE WELDING EQUIPMENT has been adapted to use in riveting stamped assemblies. Equipped with indexing table, it hot-upsets and rivets in place vanes of hydraulic flywheels. Ends of vanes stick through holes in faces of assembly



rinas. Electrodes are brought down under pressure against them, heating and at same time upsetting these ends to rivet parts securely. Right amount of heat is obtained by means of conventional welding timers combined with lower current density than would be used for welding.—**Progressive Welder Co., Detroit, Mich.**

★ ★ ★

FIRE SHIELD provides protection from heat of fires that must be fought at close proximity. Is ruggedly built of sheet steel, reinforced with strong angle irons. Between front and back plates is insulating mineral wool blanket, one inch thick, capable of withstanding temperature of 1200 deg. F. Three observation ports and four nozzle ports are each equipped with pivoted cover doors controlled from rear of shield. Sturdy anchoring chains are provided for securing playpipes in place. At base of shield are three hinged skirts which give way readily on meeting any ground unevenness. Wheel carriage is bolted to shield body so that parts may be packed knocked down. Rear supports of fire shield give great stability. Full-length handle bar extends full width of shield at top. Two short handles, normally hanging down, may be used to maneuver fire shield at scene of fire. Shield is 79½ in. high by 75¼ in. wide overall.—**American-LaFrance-Foamite Corp., Elmira, N. Y.**

★ ★ ★

BUILDING WIRE, called Hazapak, contains no critical materials in insulations and protective coverings. Copper conductor is insulated with synthetic tape and further protected with heavy layer of moisture-proof compacted Kraft paper. As no rubber insulation is involved, tin coating for con-



ductor is not necessary. Full N.E.C. wall of insulation is protected by flame and moisture resistant fibrous covering made to Dilec specifications. Is available in all regular building wire sizes for 600-v. ratings and can be supplied in all standard colors with full surface identification markings and footage measurements.—**Okonite Co., Hazard Insulated Wire Works Division, Wilkes-Barre, Pa.**

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A New Home for Navy Blimps

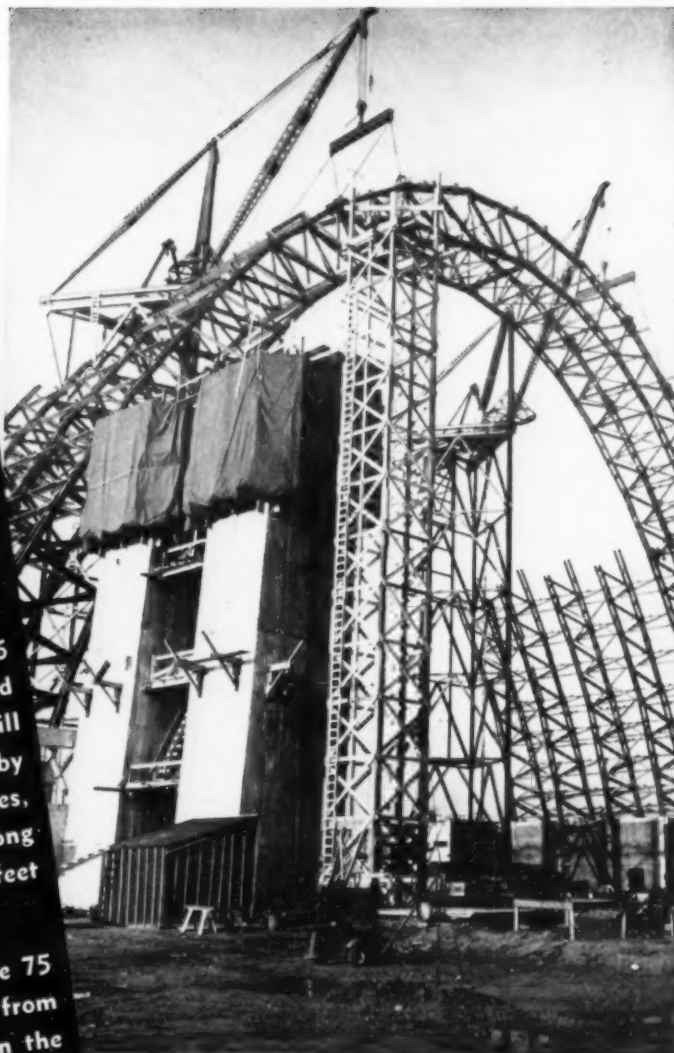
Two Clyde Steel Stiff Leg Derricks, mounted on 145 foot traveling steel towers, place sectional units of pre-assembled timber arch trusses for Naval Air Station blimp hangar on Eastern Seaboard.

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★ ★ ★

IDENTIFICATION BADGE OPENING DEVICE makes it possible to open badges for insertion of new photographs as many as five times without destroying any portion of them. Consists of two principal parts, chuck and wedge-shaped tool. Badge is held stationary in chuck by lever. Tool is mount-



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★ ★ ★

PLASTIC PROTECTIVE COATING, known as Plast-Anneal, is said to have minimum salt spray resistance five times greater than galvanizing. Other advantages claimed for it include true colloidal suspension of color pigment, rust inhibitor, and plastic that insures uniform distribution of covering and uniform thickness of durable surfaces. Is applied after fabrication, thus covering and protecting all surfaces and interstices of various ventilating units built by company. Basic formula can be altered to produce adequate protection for almost any requirement where atmospheric conditions present known concentrations of acid or alkaline solutions.—**Allen Corp., Detroit, Mich.**



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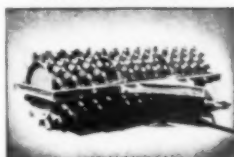
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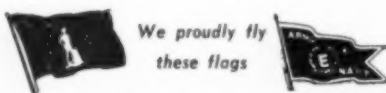
into surface being scraped, common trouble with home-made carbon steel scrapers. Made with special steel handles strong enough to withstand pressure without deflecting or bending.—Carboloy Co., Inc., Detroit (32), Mich.

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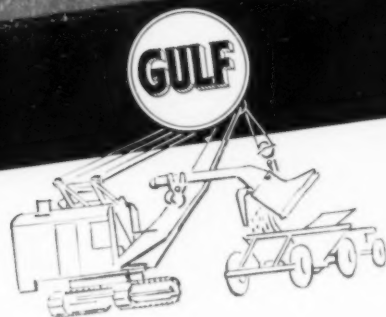
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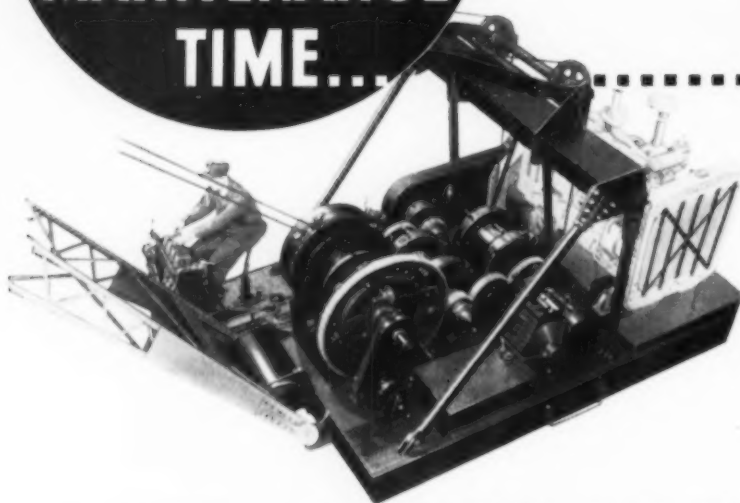
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The deck machinery is spread out to make all parts easy to get at. No pyramiding of parts. Mast does not have to be taken down to get at machinery on the deck.

Air tanks, control valves and pipes are at front of the machinery deck between the boom seats — NOT over the deck machinery.

These superior features of design save maintenance time.

Catalog No. 600-L-1A "tells all" write for your copy

AMERICAN HOIST & DERRICK CO.

SAINT PAUL 1, MINNESOTA

Chicago

San Francisco

New York

AMERICAN TERRY DERRICK CO. . . . South Kearny, N. J.

60 YEARS
OF SAFETY

1883 — 1943

The Genuine
CROSBY CLIP



Army-Navy "E" Awarded to Equipment Companies



PENNANT PRESENTED with Army-Navy "E" to employees and management of I. D. Adams Mfg. Co., Indianapolis, Ind., is displayed by, left to right, ROY E. ADAMS, president of firm; COLONEL HARRY A. MONTGOMERY of Supply Division, Office of Chief of Engineers; THOMAS A. WHITED, veteran office employee; and RALPH HARRMAN, representative of factory employees. Award is based on production of motor graders, elevating graders, leaning wheel graders, and tamping rollers for Army, Navy, and Marine Corps. In addition to its regular products, company is engaged in manufacture of gun recoil mechanisms and in processing of armor plates for tanks.

• • •

THE ARMY-NAVY "E" PENNANT has been awarded to the Austin-Western Road Machinery Co., of Aurora, Ill., with an "E" pin for each employee. Among



AT PRESENTATION CEREMONIES for Army-Navy "E" are, left to right, LIEUTENANT REGINALD RADER, U.S.N.; JACK KREITZ, shop committee chairman; McCLURE KELLEY, company president; and LT. COL. G. V. ROUNTREE, chief of Contract Service for Chicago ordnance district of Army.

the products which this company produces for the war effort are caissons, ammunition wagons, tank parts, motorized sweepers for air bases, graders and rollers for road construction and maintenance, shovels and cranes, dump and trail

(Continued on page 102)

A Shot In The Dark To Bring More Light

So many changes . . . so many questions . . . so many advances to make . . . so many discoveries made . . . one of the current problems in planning is the means to put producers and contractors with ideas in touch with each other so that these ideas may spark themselves into swift accomplishment.

—which explains why men of industry are meeting more and more to think out problems synergistically*. This does not mean "bull" sessions, either.

What do they talk about? Any problem under the sun that falls within the scope of their activities. For instance, they might talk of explosives and more effective blasting to produce greater results per dollar of cost.

They would discuss spacing, burden, the selection of the right explosive for the material to be blasted, and methods of application.

The synergistic approach to any blasting problem does not consist merely of getting quotations and receiving bids "to meet competition." Synergism introduces ideas that yield better results all along the line—in economical machine operation, in quality of blasting, in saving of equipment and time throughout.

Synergistic thinking with Atlas representatives has achieved some remarkable accomplishments for contractors. Putting your ideas together with ours may bring similar results for you. Will you make a date with us?

***Synergism**—a growing habit in American industry. Men bring problems and ideas together so that minds "click" to produce a result far greater than the sum of ideas expressed. So to speak, they make 2 plus 2 equal 5.

ATLAS

EXPLOSIVES
"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

Three billion dollars asked for postwar highway projects

Hearings expected when Congress reconvenes on bill sponsored by the American Association of State Highway Officials. Money would be used for both urban and rural roads.

Appropriation of \$3,000,000,000 for postwar highway construction and "to provide for the immediate preparation of plans and acquisition of rights-of-way to cushion the postwar conversion to peacetime economy, and for other purposes" is authorized by a bill on which hearings are expected to start soon after the Congress reconvenes. The bill, which the Congress reconvenes, Highway Act, mileage, as is done in the present act, increased weight is given to population in the new bill which proposes one-half on population, and one-fourth increased area and mileage. Giving weight to cities, it is believed, will be particularly well received in Congress because it will concentrate employment where there is the greatest demand for it. Half of the money apportioned each

LOOKING AHEAD TO V-DAY...

War's end will set in action a nation-wide job of road construction and rehabilitation.

Be ready—be competitively equipped—to get your full share of the work.

Time and cost-saving machines will enable you to handle more jobs with more profit.

Write today for complete information on Cleaver-Brooks Tank Car Heaters and Bituminous Boosters. Get the complete facts on their high speed low cost performance—heating road oils and bituminous materials to application temperatures.

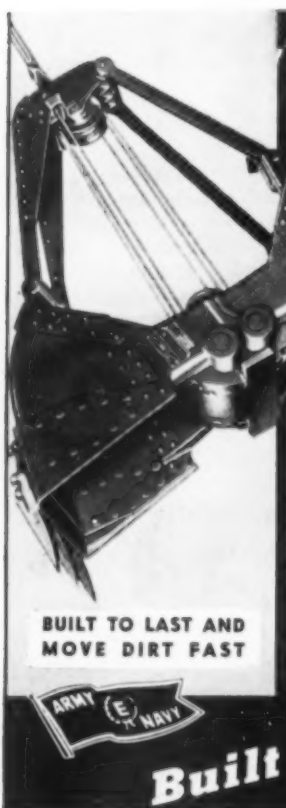
Cleaver-Brooks Tank Car Heaters are built in two and three tank car sizes—Portable Pumping Boosters in two capacity sizes, with truck mounting or 4-wheel trailer.

Send for bulletins or see your Cleaver-Brooks distributor.

Cleaver-Brooks Co., 5125 North 33rd Street, Milwaukee 9, Wisconsin

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS



WILLIAMS Buckets

WELDED ROLLED STEEL CONSTRUCTION

eliminates cumbersome dead weight and insures a stronger bucket that will wear longer with less breakage and less cost for maintenance.

This welded design which has made Williams Buckets so universally used in steel mill service is now featured in all

Williams Clamshell and Dragline Buckets $\frac{3}{4}$ to 16½ yd. capacities.

Send for free bulletin covering types of buckets for your particular requirements. It shows details of design and many exclusive features that clearly prove why YOUR NEXT BUCKET SHOULD BE A WILLIAMS.



THE WELLMAN ENGINEERING COMPANY

7017 Central Avenue • Cleveland, Ohio

Built by WELLMAN

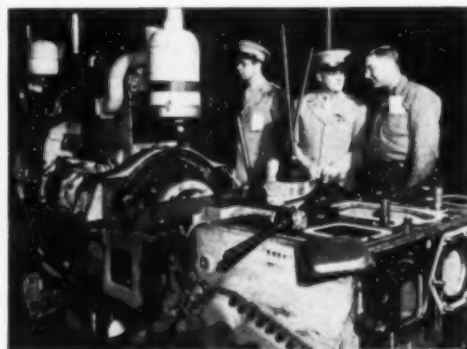
(Continued from page 100)

cars for handling ore and stone, crushing and screening equipment, and 155-mm. howitzer carriages. Parts made by the company can be interchanged with units in the field and with those made by other companies. The pennant was awarded at a colorful ceremony attended by employees, company officials and guests.



AWARD OF ARMY-NAVY "E" is made to Gustin-Bacon Mfg. Co., of Kansas City, Mo., maker of Rolagrip pipe couplings for plain-end pipe. Participating in ceremony of presenting flag are (left to right): REAR ADMIRAL ALEX. M. CHARLTON, U. S. Navy; J. F. STEPHENS, J. O. BRELSFORD, and A. L. GUSTIN, SR.

Engineer Corps Officers
Visit Equipment Factories



TOURING WAR PLANTS of Peoria, Ill., Engineer Corps officers converse with Caterpillar Tractor Co. employee. Addressing plant supervisors, COLONEL H. A. MONTGOMERY (center), executive officer of Supply Division, pointed out the importance of heavy construction equipment on world fighting fronts. With him is LT. COL. R. P. ROSENGREN, chief of Technical Information Branch.



MORE SPEED WITH KOEHRING NON-CLOGGING CRAWLERS

TRAVEL WEAR REDUCED... SERVICE LIFE INCREASED

Koehring excavator crawlers are built to reduce wear and lengthen service life. Free of dirt collecting traps, they eliminate much of the wear which swiftly ruins crawler shoes, tumblers and rollers. The self-cleaning tumblers keep crawlers clean by ejecting mud, sand, gravel, clay, loose earth and other materials. Surfaces of crawler shoes are smooth — there are no pockets to hold caked material. Weight is widely distributed through numerous rollers, which are protected by the strong V-shaped girders. These important Koehring features materially reduce upkeep and maintenance costs and permit the machines to operate free from need-less service interruptions.

KOEHRING COMPANY
Milwaukee 10, Wisconsin



DEPEND ON YOUR KOEHRING DISTRIBUTOR

to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Your Worn Dipper Teeth Are Still

"Good as Gold!"



From left to right: (1) Ready for service,—bucket tooth hard-faced along sides and at point after new tip has been welded on worn tooth. Note hard-facing protection around hole. (2) The same tooth, side view. (3) Typical worn tooth. (4) The same after welding on a new tip.

DON'T DISCARD old bucket teeth,—no matter how badly worn. Rebuilding and hard-facing with Coast Metals will make them good as new,—at less than half the cost of new replacements!

In fact, Coast Metals Hard-Facing makes your power shovel and bucket lips and teeth *better than new*, since they will outlast and outwear ordinary unprotected lips and teeth several times.

You can use Coast Metals Hard-Facing also for minimizing wear on tractors, dirt movers, rotozers, rippers, crushers and other earth-moving and road building equipment.

Patented Coast Metals Hard-Facing alloys are easily welded to all ferrous metals, including manganese steel, alloy steels, cast iron and chilled iron. Write for new pamphlet, giving full details.

COAST METALS, INC.

Plant and General Offices: Canton, Ohio
Executive Offices: New York 19, N.Y.

COAST METALS

hard-facing
weld rods

MAKE YOUR EQUIPMENT LAST LONGER

"AMES" TOOLS LEAD TO VICTORY



COLT
PONY
HUSKY
O. AMES
OPTIMUS
PEERLESS
FAVORITE
TWO STAR



Yes, on all battlefields, on farms, on railroads, in mines, on highways and in industrial plants, "Ames" products are again making history... Americans in uniform and in overalls are using these tools to bring about a speedy and complete victory... Everywhere "Ames" Brand names are as familiar as the names of home towns! Today, as in 1774, when Americans require shovels, they insist on "Ames".



AMES BALDWIN WYOMING CO.
PARKERSBURG, W. VA. NORTH EASTON, MASS.
Shovels . . . Spades . . . Scoops . . . Forks . . . Hoes . . . Rakes



RAM
CARTER
BRONCO
KNOXALL
RED EDGE
PINNACLE
THREE STAR
MONONGAH

SURVEYS MADE OF INDUSTRIES PRODUCING CONCRETE PIPE AND BLOCK

A TOTAL OF 4,581,188 TONS of concrete pipe and more than 301,096,071 concrete blocks were produced in 1942, according to surveys recently made by the War Production Board's Building Materials Division to obtain data on the geographical distribution of concrete pipe and concrete block making facilities and production.

Data on concrete pipe drawn from 432 plants representing a 98-percent coverage of the industry reveal that these plants used 112,545 tons of reinforcing steel in 1942 and employed 11,949 workers. The year 1942 was a peak production year and most of the plants were running at full capacity. Plants are widely distributed, with some concentration in the Pacific states, Texas, and the eastern half of the country.

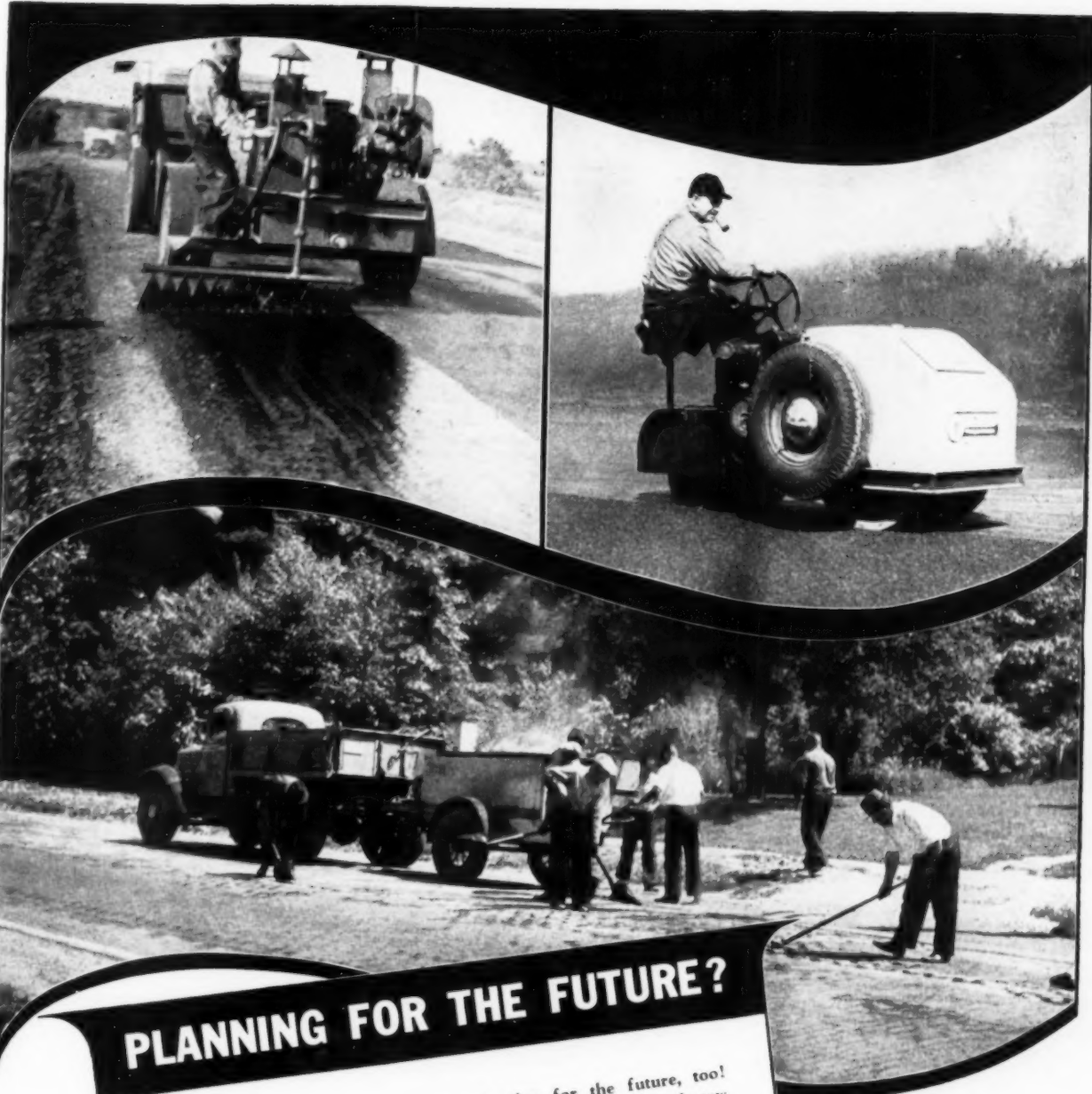
Figures for concrete block production were reported in 8x8x16-in. equivalents. The 1,695 block plants reporting in the survey, which represent a 75-percent coverage, manufactured 130,513,121 blocks made with lightweight aggregates, as compared with 151,641,073 in 1941, and 170,582,950 blocks made with heavy aggregates, as compared with 208,214,441 in 1941. These plants employed 9,251 workers in 1942. A record production was reached by the concrete block industry in 1941. This industry has large concentrations in the heavily populated areas, especially in the Lake and New England States and in Minnesota, Iowa, Pennsylvania, Maryland, New Jersey, and New York.

★ ★ ★

Repair Parts Needed for Equipment

AN URGENT APPEAL to manufacturers of construction equipment to increase production of repair and spare parts was issued Oct. 13 by the War Production Board's Construction Machinery Division. Present output of parts is at the rate of 50 percent of the total dollar value of equipment produced, while peacetime output of parts was at the rate of 15 per-

(Continued on page 106)



PLANNING FOR THE FUTURE?

Let's not forget the present—still let's plan for the future, too! Our vital transportation system calls for the construction of new Highways, Roads, Streets, and the repair of our present system, so be prepared—plan to purchase your Littleford Black Top Construction and Maintenance Equipment after Victory. Pave the Road to Victory first, pave the Roads later.

Upper Left: Littleford No. 101 Utility Spray Tank
 Upper Right: Trail-O-Roller
 Bottom: 84-HD Kettle







LITTLEFORD

LITTLEFORD BROS., INC.
 465 E. Pearl St., CINCINNATI, OHIO

MERCER
"The Name that Carries Weight"



EQUIPMENT
for the
HANDLING
of

CONSTRUCTION

MATERIALS

**Cranes, Elevators, Lift & Trailer Trucks,
 Conveyors, Live Skids, Drum Hoists,
 Winches, Tool Wagons, Carts.**

WRITE FOR DETAILS
MERCER-ROBINSON COMPANY
 INC.
 30 CHURCH ST. • NEW YORK 7, N. Y.

(Continued from page 104)

cent of total production, by dollar value. Despite this increase, not enough parts are being produced to meet present requirements, Division officials said, and 1944 demand is expected to be even higher. Most urgently needed are parts for power shovels and cranes.

The abnormally high demand for parts is due to several factors:

Approximately 95 percent of new cranes and shovels are used for military work overseas and at home. These items are shipped overseas with spare parts to the amount of 25 percent or more of total value to provide for adequate maintenance.

At home, where only 5 percent of new cranes and shovels and only about 10 percent of all new construction machinery are available for civilian purposes, a large amount of secondhand equipment has been pressed into service, with resultant increase in the need for maintenance parts. Moreover, equipment at home is being operated 18 to 20 hr. daily instead of the normal 8 to 10 hr., and an added factor in increased demand for repair parts is the lack of experienced operators, many of whom are now in the Armed Services.

In an effort to increase production of parts, the construction machinery industry is using subcontracting to an ever greater extent. Available facilities of the machine tool industry are being used in particular. The output of heavy spare parts, machined from castings, is hampered by manpower shortages in steel foundries.

Manufacturers of construction equipment are urged to call on the Division's Repair Parts Section for advice and assistance in stepping up their production of parts.

★ ★ ★

**STEEL AND
 POST-WAR PUBLIC WORKS**

By ROBERT MOSES

Commissioner of Parks, City of New York

(An address before the annual convention, Oct. 21, of the American Institute of Steel Construction)

THERE IS A TENDENCY on the part of big business to assume that if government restrictions are released after the war, private initiative and capital can take care of the entire post-war employment problem. It is even claimed that

(Continued on page 108)

SAVED for vital wartime traffic



Resurfacing worn concrete on State Trunk No. 31, south of Elgin, Ill. Center photograph shows TEXACO Asphaltic Concrete binder course on the right and the TEXACO Asphaltic Concrete wearing surface on the left.

With transportation a vital part of the war effort, worn-out sections of strategic highways must and are being corrected.

Take this section of State Trunk 31 in Illinois, for example. When it could no longer serve wartime traffic efficiently, the highway department employed a type of improvement which has been used widely by many States, including Illinois.

After the worn highway had been primed with emulsified asphalt a 3-inch TEXACO Asphaltic Concrete pavement was constructed in two courses, each 1½ inches thick. A resilient, easy-riding, heavy-duty pavement is obtained at moderate cost, which will take hard wear for years with minimum upkeep.

When you plan your post-war highway program, make provision to resurface worn highways having adequate bearing strength with TEXACO Asphaltic Concrete. A TEXACO Engineer, who specializes in Asphalt construction, is at your service.



THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd St., New York City
Philadelphia Richmond Boston Chicago Jacksonville Houston

TEXACO ASPHALT



CONNECTING RODS

are
L-O-N-G-E-R
in
WISCONSIN
HEAVY-DUTY
AIR-COOLED
ENGINES

The length of rods in Wisconsin Engines is $2\frac{1}{2}$ times the length of the stroke. This extra length is an important factor in reducing vibration to a negligible minimum because long rods reduce angularity and this, in turn, reduces piston pressures against the cylinder walls. The shorter the rod, the greater the vibration and wear — so we don't use short rods in Wisconsin heavy-duty air-cooled engines. Another detail that contributes to Wisconsin dependability.

**MOST
POWER
Per
POUND**

WISCONSIN MOTOR

Corporation

MILWAUKEE, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

Saves Manpower, Time and Money

Simplex No. 22; 10-ton capacity; $12\frac{1}{2}$ " lift. Height closed $21\frac{1}{4}$ ". Toe lift $2\frac{1}{4}$ " from ground level.

Simplex No. 22 Jack has been a standby in the construction field for over a generation. Today it is especially prized as a manpower saver. It combines fast operation, a broad lifting range and safety in a staunch, lightweight jack; easily operated by one man. Have them handy on every construction job. Stocked by leading supply houses.

Templeton, Kenly & Co., Chicago (44), Ill.
Better, Safer Jacks Since 1899



Simplex

LEVER · SCREW · HYDRAULIC

Jacks

Make Your Jacks Last Longer!
Send for bulletin on the proper lubrication, care and handling of jacks. Helps cut replacements.

(Continued from page 106)

the present tremendous employment figures can be maintained, and that the rate of spending can be continued without very much reduction after the government expenditures drop from around one hundred billion dollars a year to thirty or forty billions; men in the armed forces and in industry will be taken care of without any public works relief work, home relief, bonuses, increased unemployment insurance and other security benefits, all by the unbeatable American spirit of free enterprise.

The sooner your industry and others get away from this hokum, the better off you will be. Cuts in government spending, cancellation of war contracts, demobilization of armed men and plant workers, no matter how gradual and humane, are bound to produce the most serious unemployment problems of our history. These problems are not to be laughed off by fine phrases. Neither stainless steel, nor plastics, nor electronics, nor Beardsley Ruml's new tax cutting plan, individually or severally, will turn the trick. It requires a combination of all forces, public and private, which make men, machines and money work, which facilitates the exchange of goods and the flow of credit, marshaled for the greatest test to which we have ever been put. The best brains of the country will be none too good for the solution of this problem.

Public Works Essential

Your industry will need public works for stimulation, pump priming and re-tooling in the slump period of at least 18 months following the end of the war. Personally I have never been able to figure out what difference it makes to you where you get your orders, so long as you get them. Why is an order for steel for a private structure any better than an order from a municipality or a semi-public agency, or even a foreign government? It takes steel to make automobiles manufactured by private corporations. It also takes steel to make roads built by public agencies. It so happens that the steel which goes into the reinforcement of concrete is just about the simplest and easiest thing for you to make, and I should think you would be glad to get orders for it in the period immediately following the war, in which you need just such orders for the simplest products you can turn out.

New York City's Post-War Plans

New York City has taken the lead in planning post-war improvements. (See article by Arthur A. Johnson in the Oc-

(Continued on page 110)



**CONSTRUCTION
AHEAD**

**WATCH FOR
THE SIGNS**

12 ton crane; or 10 ton crane fully convertible to 1/2 yard shovel, trench hoe or dragline—"ready for the road"—and the next job. All MICHIGANS have fingertip AIR CONTROLS.



When the desirable jobs "break", be prepared to secure your full share. The time to consider new equipment for handling these projects is NOW.

When it comes to mobile Shovels and Cranes, the veteran air-controlled MICHIGANS stand out in front with their high mobility plus rugged stamina, convertibility plus ease of operation.

There's vast CONSTRUCTION AHEAD—Watch for the signs—and be ready with MICHIGANS.

GET THE FACTS NOW—

Write, wire or phone for Bulletin CM-113.



MICHIGAN
POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN



SMOOTH SAILIN'

You can utilize any available man-power for operating your Sterling Wheelbarrows, because Sterlings are easy-wheeling barrows that assure "smooth sailing" on any job. Built to take it . . . 24 hours of the day, if necessary . . . Sterlings simplify your material transport problem. Millions have been built in the past . . . more will be available in the post-war era.



STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Sterling WHEELBARROWS

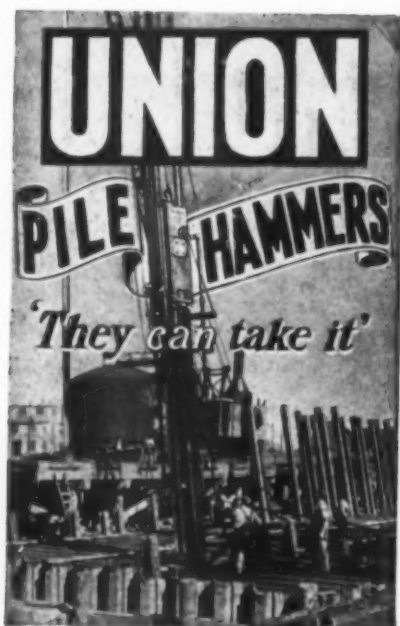
Look for this Mark of Sterling Quality

A 4226-1/4

UNION

PILE HAMMERS

'They can take it'



Ready!—for quick reference and ALL FACTS on what UNION makes for speedy plant construction—write or wire NOW for Catalog 184E.

EST. 1900
Union Iron Works, Inc.
 ELIZABETH, New Jersey



Army-Navy E awarded to each of the four Onan manufacturing plants.

ELECTRICITY FOR ANY JOB ANYWHERE

* ONAN GASOLINE DRIVEN ELECTRIC GENERATING PLANTS provide power and light for construction projects anywhere, for all applications where electricity is not otherwise available, and for emergency service.

They're doing a war winning job on all fighting fronts.

Sizes from 350 to 35,000 watts. 50 to 800 cycles, 110 to 660 volts, A.C. 6 to 4000 volts, D.C. Also dual A.C.-D.C. output models.

Your inquiry regarding present or post war needs will receive prompt attention. D. W. ONAN & SONS, 1649 Royalston Ave., Minneapolis, Minn.

ONAN
 ELECTRIC PLANTS

(Continued from page 108)

tober, 1943 issue of *Construction Methods*, p. 74). Your industry has helped us to break down our designs into men, materials and equipment. We are going to find out, for example, just how much steel goes into this program, how fast it can be obtained, and how many men will be employed on the job and back of the job in its use. We can then schedule our improvements realistically and not assume that a whole lot of men will be employed if there is no material for them to work with. So far we have found that we shall require more than 400,000 tons of structural steel for the New York City post-war program and more than 250,000 tons of reinforcing steel. This represents sizable orders for one municipality and is an indication of how much steel would be needed for the whole country if we had a genuine nation-wide public works program.

Post-War Expansion

I am strongly in favor of applying every possible stimulus to private business and industry, big and small, to make plans now for post-war expansion. Public works, however necessary and however compressed to afford employment, are not a permanent solution of our post-war economic problems, but they are a very necessary incident if we are to avoid relief and the inevitable disappointment and recriminations which are bound to result from the assumption that bankers and businessmen, all by themselves and without any government help, can be trusted to meet the challenge. Among other things, private industry will be pretty busy after the war settling its accounts with the government and finding out what it owns and what belongs to the Defense Plant Corporation and other government lending agencies.

Cooperation Without Conflict

The cooperation of the steel industry with the City of New York on the City's post-war program shows that there need be no conflict between business and government in post-war planning. Steel has taken the lead, and other industries are bound to follow. The important thing now is to stop vamping about the great new world of inventions, mechanization of everything in sight, and effortless living, and concentrate on a resumption of hard, competitive work on a larger and better scale than before the war. Steel has probably been the greatest single product in the winning of the war. It has an equally great role to play in peace. We began to get real war production when we stopped talking and got down to business. The same logic must apply to post-war plans.



A Firestone

TIRE SPECIALIST Can Help Keep Your Equipment on the Job!

MAINTENANCE of equipment is the most important job that faces most contractors today. Never before has there been so much emphasis on saving fuel and tires. To help you obtain full service from your tire equipment, Firestone offers you the services of a specially-trained tire specialist. He will analyze your earth-mover tire equipment and:

- ★ Report on tire abuses that are causing premature wear.
- ★ Recommend treading and repairing where necessary.
- ★ Advise on which wheels treaded and repaired tires should be used.
- ★ Examine tires removed from service for additional evidence that may show how to make your tires last longer.
- ★ Will assist your tire service man in setting up a regular routine for earth-mover tire maintenance.

Don't delay — act today! Call your nearby Firestone Dealer or Firestone Store and arrange for a complete analysis of the tires on your earth-moving equipment by a Firestone tire specialist.

GROUND-GRIP TRUCK TIRE

For use on driving wheels of earth-moving trucks, truck tractors and semi-trailer units in soft going or fill.

ROCK GRIP EXCAVATOR TIRE

Cut-resisting tread with double thick sidewalls for greater strength in strip-mining operations.

ALL-NON-SKID EARTH-MOVER TIRE

For scrapers and trailer wagons. Low inflation pressures prevent impact breaks and provide maximum flotation and traction.

ROAD BUILDER TIRE

Has no equal for use on road graders. Compression fit of beads allows low pressures without slipping on rims. Ground Grip tread for extra traction.



Copyright, 1943, The Firestone Tire & Rubber Co.

FORM-TY ENGINEERING FACTS

*"Tyscrus" are Engineered
All Ways for
Greater Strength—
Greater Safety.*

Diam. Inches	No. of Struts	Safe Load lbs.	Ult. Load lbs.
1/2	2	4000	9500
3/4	2	12000	18000
1	2	18000	27000
1 1/4	4*	24000*	38000*
1 1/2	4	30000	55000
1 1/2" Water- Seal	2	4000	9500
1 1/2" Coil Cone	2	4000	9500

PUT MONEY IN YOUR POCKET

WITH THESE TIME & DOLLAR SAVING ADVANTAGES

Light Weight— $\frac{1}{2}$ the steel required for field assembled devices.
Great Strength—engineered for ultimate loads up to 55,000 pounds.
Streamlined Simplicity—capable of many job combinations and field uses.
Assembles Quicker—coarser threads than ordinary rods speeds work.
Double Duty—acts as spreader with ends against form face or unthreaded cones.
Better Job—the end keeps back from form as much as 3".
Many Sizes—7 standard units and specials to specification.
Less Costly—working parts loaned, not sold, not rented.

Why not take a tip from the Army, the Navy, and some of the largest construction companies in the country? Turn to Richmond and get the benefits of Form-Ty Engineering—that begins with your job plans and carries through to tys promptly delivered and tagged for their location on your job. It's this scope of service that makes "Richmond" the first choice of construction engineers.

**RICHMOND SCREW
ANCHOR COMPANY, INC.**

816 LIBERTY AVENUE • BROOKLYN, NEW YORK

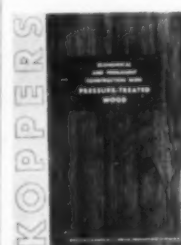


NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

ECONOMICAL AND PERMANENT CONSTRUCTION WITH PRESSURE-TREATED WOOD—Wood Preserving Division, Koppers Co.,



Pittsburgh, Pa. (28 pp., illustrated) Explains several processes by which lumber is treated to protect it against decay, termites, fire, marine borers, and acids. Pictured are number of recently completed pressure-treated highway bridges, one of which is typical of nine that were built for \$70,900, as contrasted with estimate of \$212,000 for

building them of other permanent materials. Reference table gives recommended uses of treated lumber for highways and other specialized fields.

★ ★ ★

THERMOPLASTIC COATING—American Pipe & Construction Co., P.O. Box 3428, Terminal Annex, Los Angeles, Calif. (4-p. bulletin) Describes Amercoat No. 33, new liquid plastic for application on metal, concrete, or wood. It is cold-applied by conventional spray or brush methods. Combination of most inert synthetic resins obtainable, it has been used as lining for storage tanks and other equipment to protect foods from contamination by corrosion caused by dilute acids or caustics; for superstructures, deck machinery, ventilators, and other marine equipment; for shower bases and laundry trays in defense housing, Army, Navy and air bases, shipyards, and factories; and for protecting machinery in chemical and bottling plants, breweries and dairies.

★ ★ ★

CONVEYORS—Robins Conveyors, Inc., Passaic, N. J. (6-p. illustrated folder) Describes use of company's products in various countries, including Chile, Brazil, Peru, West Africa, Spanish Morocco, South Africa, Indian Ocean, Sweden, Spitzbergen, Russia, England, Scotland, and Australia. Lists company's products, which include belt conveyors, coal and ore bridges, bucket elevators, car and barge hauls, car dumpers, car retarders, chutes, conveyor idlers, conveyor pulleys, crushers, feeders, foundry shakeouts, gates, grab buckets, pivoted bucket conveyors, ore bedding systems, vibrating screens, screen cloth, self-unloading boat mechanisms, skip hoists, takeups, loading and unloading towers, trippers, weigh lorries, and winches.

LEVELING OFF FOR A LANDING FIELD



Today's plans become tomorrow's realities. With the tremendous advance in aircraft development airports, landing fields, and landing strips along super highways will honeycomb not only this nation but every country in the world. This means that veritable continents of dirt must be moved—leveling the high spots and filling the low ones. Wooldridge Scrapers have kept apace and ahead of the needs of heavy-duty earth-moving requirements. They are designed and built to handle more yardage per load and more heaping yardage loads per shift. In starting tomorrow's plans today, plan to employ Wooldridge Scrapers and equipment on projects where time, yardage and cost are the essence of your contract. Before you buy any heavy-duty earth-moving equipment investigate the reasons why Wooldridge is best suited to your demands.

WOOLDRIDGE

MANUFACTURING COMPANY • SUNNYVALE, CALIFORNIA

SCRAPERS • POWER UNITS • BULLDOZERS • RIPPERS • TRAIL BUILDERS

WOOLDRIDGE Heavy Duty Earth-moving

Scrapers are built in sizes ranging from 4

to 30 cu. yd. capacities. They are supplied

to the United States Government for es-

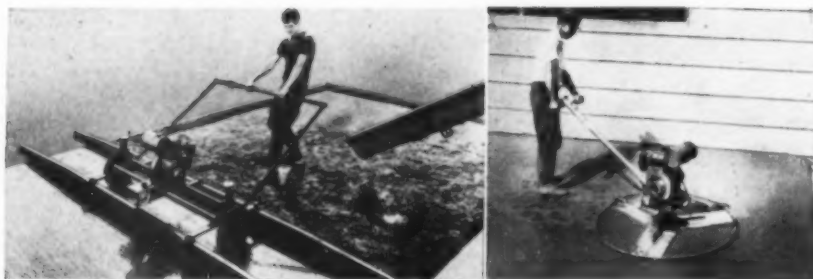
sential war jobs, for two line operation

permitting two drum power units to be

used. WOOLDRIDGE Scrapers operate on

pivot-tilt forced load ejection principle.

BOILING BOWL
TERRA CLIPPER
PRINCIPLE
SCRAPERS



Whiteman CONCRETE EQUIPMENT

Has proved its value in saving labor and speeding construction on many war projects. The WHITEMAN Rodding Machine, the combination Floating-Finishing Machine, the Hand Grill Tamper and the Screed Stake Cap (illustrated at right) are available on properly rated orders.

For information see your nearest distributor or write direct.

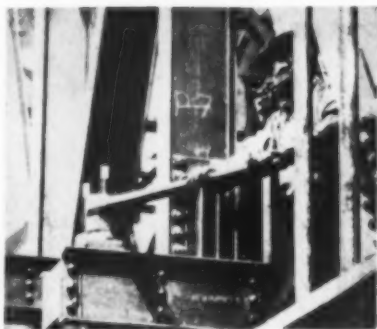


Whiteman MANUFACTURING CO.

3249 Casitas Avenue

Los Angeles 26, California

Bridge Constructors Depend Upon



LOWELL Reversible Ratchet WRENCHES

For running up nuts on anchor bolts and connections, bridgemen need wrenches that will work fast and SAFELY.

The LOWELL "Steel Socket" Bridge Builders' Wrenches—with their positive guarantee that handles will not break—meet the tough requirements of big bridge jobs.

Built in a wide range of types and sizes to cover many needs of the engineering-construction field.

Have patience with your dealer if he is unable to furnish all of the NUMEROUS LOWELL types and sizes, because we are engaged, for the duration, in supplying the needs of our Armed Forces.

LOWELL WRENCH CO.

1869 WORCESTER, MASS., U.S.A. 1943



See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear, in a straight line and with a "square" contact. The pawl is in COMPRESSION ONLY—no shear, no tension, no torsion. The shipper carries NONE of the load. This strong construction insures steady service.

EQUIPMENT LUBRICATION GUIDE—Gulf Oil Corp., Gulf Bldg., Pittsburgh, Pa. (63 pp., illustrated) Owners and operators of construction equipment will find in this booklet many helpful recommendations on selection and application of lubricants to insure proper operation and maintenance of their power and other units. Text covers such subjects as engine lubrication, care of air cleaners and oil filters, bearings, cooling systems, ignition systems, valves, gears, pumps, and power transmission assembly. There are a number of practical suggestions on cold weather operation. Lubricating oil recommendations are embodied in charts covering both gasoline and diesel engines. Similar tabulations apply to transmission and axle lubricants. One chapter contains suggestions on storing equipment to insure against rust and corrosion. Characteristics of company's various types and grades of motor oils and other lubricants are described in detail.

★ ★ ★

CARE AND REPAIR TIPS—Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill. (20-p. illustrated booklet)



Summarizes rules for extending operating life of Athey "forged-trak" wheels. Includes sections on inspection, lubrication, and reconditioning. Field and shop repair of wheels is covered in 40-p. booklet divided into three sections: Field reconditioning, shop reconditioning, and lubrication. Another 16-p. booklet gives instructions for rebuilding "forged-trak" tracks. Text and illustrations give

complete story of all operations involved in reconditioning both counter-bored and non-interlocking type tracks. It points out that reconditioning work will be more satisfactory if work is performed before bushings are worn through and before pins are worn loose in track links.

★ ★ ★

SPEED-UP TOOLS AND EQUIPMENT—Ideal Commutator Dresser Co., Sycamore, Ill. (92-p. illustrated handbook) Covers motor maintenance equipment, industrial electrical equipment, variable speed transmissions, machine tool accessories, and wiring devices and tools. Chapters are: (1) Maintenance Equipment; (2) Coil Winding Equipment; (3) Wire Insulation Strippers; (4) Portable Industrial Cleaners; (5) Brazing and Soldering Tools; (6) Safety Tools and Equipment; (7) Flashlight Storage Battery; (8) Fuse Devices and Tools; (9) Wiring Devices and Tools; (10) Electric Marking Tools; (11) Machine Tool Accessories; and (12) Variable Speed Transmissions.

★ ★ ★

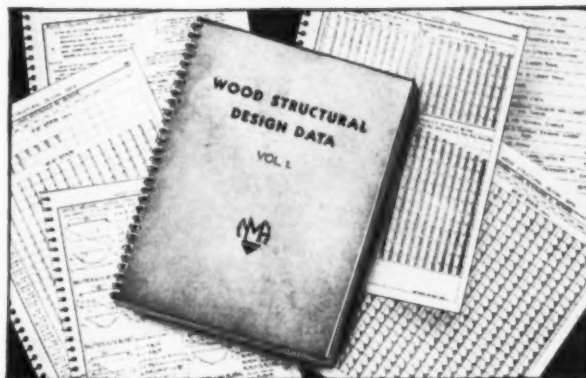
SYNTHETIC RESIN GLUES GO TO WAR—I. F. Laucks, Inc., Maritime Bldg., Seattle (4), Wash. (20-p. illustrated brochure) Shows how waterproof glues are used in construction of wood-and-glue airplanes, ships, defense homes and buildings, arches and beams, and such smaller items as laminated pulley wheels, ammunition boxes, and cleats. All types of Laucks line of glues are described—phenol resins, urea resins, melamine resins, casein, casein-soybean, and soybean glues. Includes section on wood preservatives which explains company's complete series of low-cost treatments for plant application, including water-repellent toxic preservatives.

SERVICES TECO HAS FOR YOU

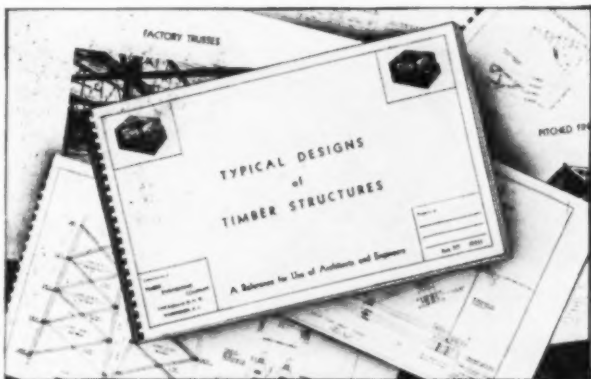
WHEN YOU BUILD WITH WOOD



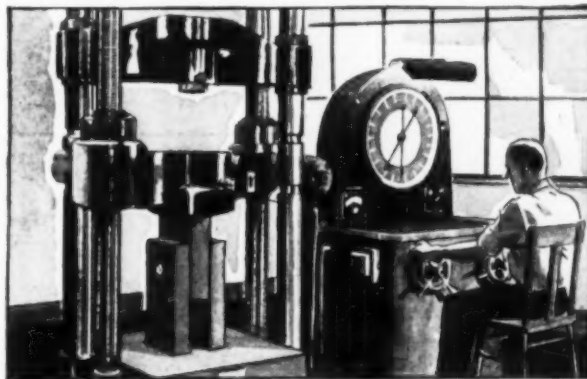
CONSULTING SERVICE. Teco maintains a staff of engineers to consult with architects and engineers on their design problems. Teco Connector distributors and fabricators in all parts of the country also render helpful services.



DESIGN DATA SERVICE. Teco has available for architects and engineers complete data on all phases of timber design, including tables and charts on timber beams, columns, floors, connector loads, bolt loads, stresses, etc.



TYPICAL DESIGN SERVICE. "Typical Designs of Timber Structures"—a 100-page book—is available to architects and engineers free upon request. Copies of several hundred other designs of typical Teco Timber Structures are also available on request.



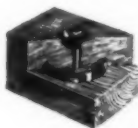
RESEARCH SERVICE. Teco conducts a continuous research program through laboratories as well as sponsoring research at outstanding engineering colleges to increase the design knowledge of timber designers.

Wood is often referred to as the *rediscovered* material, due to its development by science for plastics, laminations and heavy construction.

Engineering science that developed the Teco Connector System of timber construction is responsible for the position timber occupies as a leading heavy construction material.

The Teco timber system serves our war effort . . . it will *serve you* in peace times too.

TIMBER ENGINEERING COMPANY
—Washington—Chicago—
Minneapolis—Portland.



The **TECO** Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

Specify
TECO
CONNECTORS
★ **TOOLS** ★

ENDORSED BY LEADING LUMBER MANUFACTURERS
AND FABRICATORS





Write, wire or telephone for further information.

JACKSON... HYDRAULIC VIBRATORS ARE VERSATILE

... they give you what you want. Designed for a wide range of applications, the standard 2 3/4" diameter head is quickly interchangeable with a grinding head for use where wet rubbing or dry grinding is required. Use of a chuck in place of grinding wheel converts grinder into a drill.

A simple twist of the manual valve and you can have any speed, from idling to 6800 R.P.M. submerged. The JACKSON Hydraulic Vibrator gets things done. Economically! It is an ideal general purpose internal vibrator.

ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.



GATKE Brake Blocks and Frictions — Moulded to machined accuracy in ALL shapes and sizes —

GATKE MAKES
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FOR smooth, positive, non-grabbing action for Starting, Swinging, Hoisting and Stopping — you want GATKE High-Heat-Resisting Asbestos Brake Materials.

They are specially engineered and service-proved for all brakes and clutches of Excavating, Road Building and Construction Equipment.

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Send for our New 60 page
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PREVENTING WELDING AND CUTTING FIRES— International Acetylene Assn., 30 E. 42nd St., New



York (17), N. Y. (16-p. pocket-size booklet) Written in easy-to-understand style, it aims to instruct users of welding and cutting equipment in reducing potential fire losses. Contains brief, clear discussions of chief causes of fires and practical measures for preventing them. It is available in reasonable quantities without charge from association or from any manufacturer of oxygen, acetylene, carbide, or welding and cutting equipment.

★ ★ ★

EXPANSION ANCHORING DEVICES—Chicago Expansion Bolt Co., 2240 W. Ogden Ave., Chicago (12), Ill. (20-p. catalog) Presents helpful data for all users of expansion anchoring devices. Is completely illustrated with full installation instructions. Items covered include expansion bolts, expansion nuts, anchoring units, toggle bolts, lead wood-screw shields, lag screw shields, single and double machine bolt shields, hook bolts, and drilling devices.

★ ★ ★

LUBRICATING OIL PURIFIERS—Youngstown-Miller Co., Sandusky, Ohio. (6-p. illustrated folder) Describes A and GH lines of lubricating and hydraulic oil reclaimers with capacities ranging from 2 1/2 gal. in 70 to 90 min. to 120 gal. in same length of time. These reclaimers are recommended for restoring all types of used oils, including oils drained from aircraft engines, diesel locomotives, marine stationary diesel engines, hydraulic machines, gear reducers, compressors, portable diesels, gasoline engines, gas engines, ice machines, vacuum pumps, and similar installations.

★ ★ ★

Butyl Rubber Output

(Continued from page 75)

building, the design was completely changed to eliminate structural steel. The storage end of the expanded building has a reinforced-concrete frame of two-story height; the single-story finishing end of the structure is framed with reinforced-concrete columns and timber roof trusses supporting a decking of gypsum plank. The timber trusses, 8 ft. deep, spanning a distance of 58 ft. between column centers, were constructed of green wood with splitting connectors to develop shear resist-

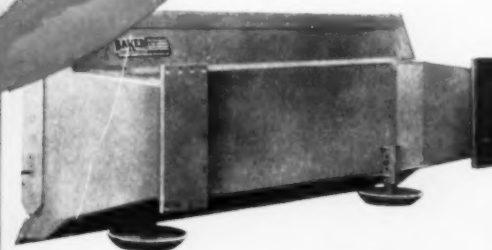
(Continued on page 118)

Ave. Nueve
de Julio
Buenos Aires
Arg.



State Street
Chicago

**Wherever
there's earth to
be moved, Baker Hydraulic
Bulldozers are on the job!**



Chicago gets a new subway and Bakers are put on the job—mucking, ramp grading and spreading material. Buenos Aires, Argentina gets an overpass and Bakers do the earth moving and stock piling with their usual speed. A Baker Gradebuilder gouges a Persian mountain side, turning trail into road, so thousands of tons of Allied supplies can roll into Russia's back door. Dutch Harbor, Alaska gets an unprecedented blizzard and Bakers—that built the air base—are called out to remove snow so patrol planes can land and take off.

The sun never sets on Bakers with their direct hydraulic lift and full down-pressure on the blade. On every continent they're in the thick of it, helping shove the war down the aggressors' throats. When the job is done, Bakers will be a familiar sight once again along highways, on building projects, and in pits.

Built Like a Battleship!

You can "pour it on" a Baker—crowd the blade, hog out big loads, doze trees or large boulders, roll logs—they're built to take it. The construction of this front end is typical of the entire unit. Note rugged box type reinforcing for moldboard and push members. High carbon steel renewable side cutters and blade.

THE BAKER MFG. CO.
568 Stanford Ave. Springfield, Ill.



BAKER

The Modern Tractor Equipment Line
for
**EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE**

**Speed—
GIVES INSLEY
THE EDGE**

All other factors being equal, the shovel or drag or crane that works fastest is the best for the job. Advanced engineering and manufacturing methods have endowed Insley Excavators with maximum economy and endurance but it is that extra dirt moving speed . . . that faculty for working at full efficiency in the closest quarters . . . that gives Insley the edge. There you have the reason why all the Insley Excavators we can produce are going directly to victory jobs where every second counts.

INSLEY
EXCAVATORS • CRANES • BUCKETS • CARTS
CONCRETE PLACING EQUIPMENT

INSLEY MANUFACTURING CORPORATION
INDIANAPOLIS, INDIANA

(Continued from page 116)

ance at all working joints. To allow for shrinkage, the top chords of the trusses were fabricated with a 1½-in. camber. Exterior walls of the expanded storage and finishing building are closed with brick.

Critical Materials Saved

In process equipment, efforts likewise were made to save critical materials wherever possible. A tonnage of about 20,000 in all metals was required for the three butyl rubber units. About 90 per cent of this tonnage was in steel and iron. The remainder was distributed among a number of metals, several of which were critical. Alloy steels made up the largest item among these, and others were copper, brass, bronze and Everdur. Not so critical was lead, needed in fairly large quantity for lining acid concentrators and piping.

A considerable saving in structural steel was made in the construction of butyl rubber units No. 2 and 3, by substituting precast concrete posts for the conventional steel supports under overhead process pipe lines. Hundreds of these precast units were erected on the butyl job, as indicated by accompanying photographs.

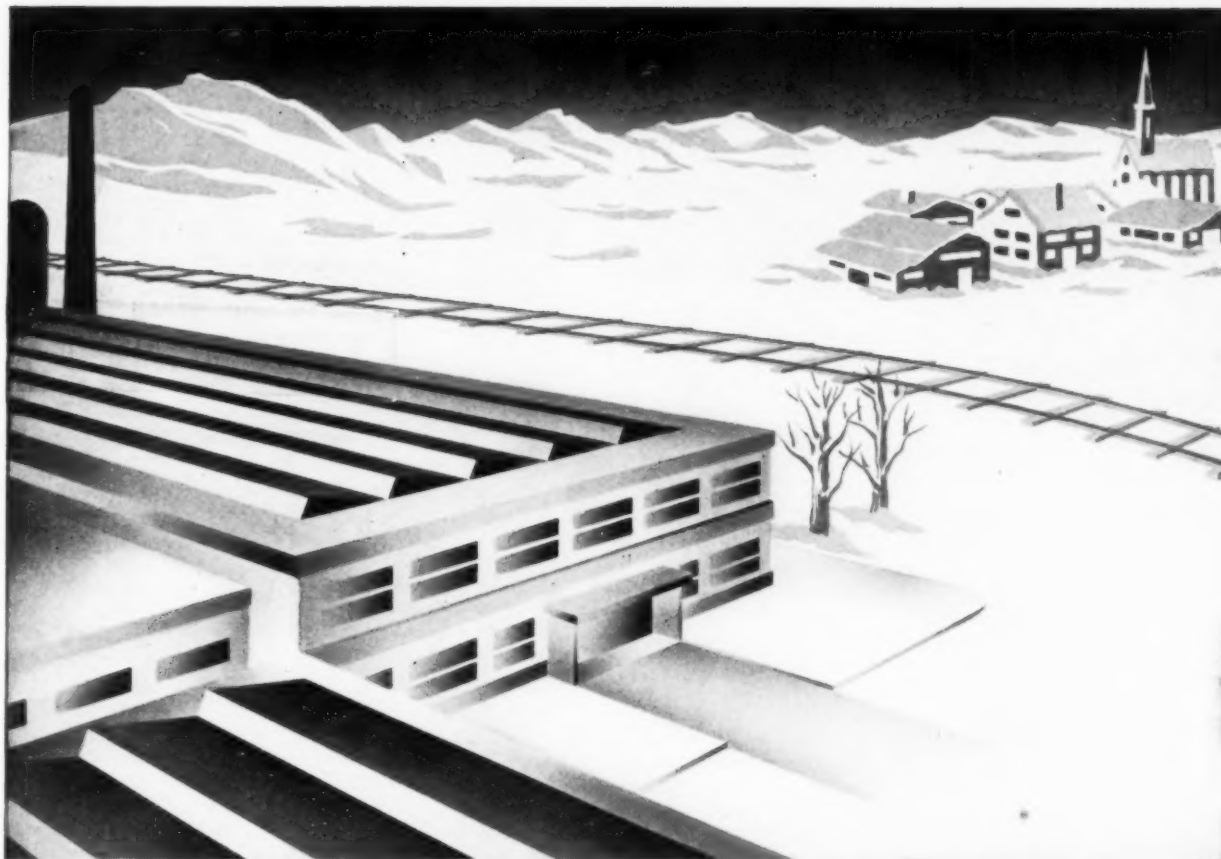
Construction Quantities

Exclusive of sand, gravel and cement for 30,000 cu. yd. of concrete placed in the butyl rubber plants, the job required 1,229 carloads of materials and equipment. Structural steel amounted to 40 to 45 carloads. The buildings took about 700,000 brick and 218,400 sq. ft. of corrugated asbestos-cement sheets. Miles of piping were required.

Pipe Lines

Of the 1,229 carloads of material, 309 represented pipe of various descriptions. Concrete pipe, used in sizes up to 5- and 6-ft. diameters for sewers and aqueducts, took the greatest number of cars, 118. Steel pipe, extensively employed in the process lines, filled the next greatest number, 114. Other classes of pipe were cast-iron, for high-pressure fire mains and some parts of the service water system, 43 cars; vitrified clay pipe for acid sewers, 28 cars; and Transite asbestos-cement pipe for the circulating water system up to 85- or 90-lb. pressure, six cars. A considerable quantity of the processed piping was stainless steel or lead-lined steel. Stainless steel is needed,

(Continued on page 120)



How to raise a plant in WINTER...at wartime speed!

It's winter. It's cold. A vital war plant must be built quickly. If this job were yours, how would you get it ready on time?

One way to get the best of winter weather and to meet wartime construction schedules is to use Atlas High-Early cement. It gains strength rapidly and produces serviceable concrete in much less time than is required with normal portland cement. Forms often can be stripped in twenty-four hours instead of the customary 3 to 5 days...and then reused again. Heating, protection, and curing time is slashed as much as 70%.

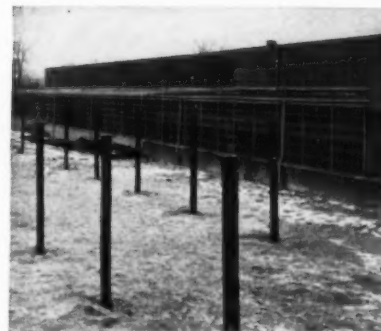
Atlas High-Early often saves

costs too...costs of forms, of equipment, of heating, and of manpower.

You can depend on Atlas High-Early this winter wherever time and labor savings are essential. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, New York.

* * *

OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham, Waco.



Monarch Machine Tool Company, Sydney, Ohio, needed a sizable addition to their plant by April 1. Work started January 17. The contractor chose Atlas High-Early cement. Mean temperature during concrete placement stayed below freezing—fell as low as 10°F. Concreting was completed thirteen days ahead of original schedule date.



SAVE TIME IN WARTIME WITH Atlas High-Early Cement

A UNIVERSAL ATLAS PRODUCT

CM-H-59

Air where you want it ...until the job is done!

It means something for an air compressor to give you air where you want it—from the time the compressor is put on the job until its job is finished. For this reason, a SCHRAMM Air Compressor was selected by a State Highway Department to operate breakers, rock drills, clay spades, and other tools for emergency repairs on an important national highway.

In SCHRAMM, both compressor and engine are coupled into a single, rigid, permanently aligned unit by means of a sturdy clutch housing which maintains alignment under the severest conditions. Both engine and compressor are watercooled, and there's forced feed lubrication for longer wear, push-button for easy starting. And since modern engines are used for operating speeds 50% higher than formerly, Schramm compressors are designed to match these new speeds, assuring maximum torque and maximum horsepower per gallon of fuel. This is made possible by the use of mechanical intake valves operating from a camshaft in perfect timing with the crankshaft, and piston travel similar to the best automotive design.

For full details, write today for Catalog 42-PA.



SCHRAMM INC. **THE COMPRESSOR PEOPLE**
WEST CHESTER
PENNSYLVANIA

(Continued from page 118)

for example, in low-temperature service.

With very few exceptions, the steel-frame structures are entirely riveted, but the connections in the process pipe lines were almost exclusively electric arc-welded. Towers and pressure vessels came to the job entirely prefabricated, and all special fittings and connections of pipe lines likewise were prefabricated so far as possible in the shops before shipment to the butyl rubber plant. Even with this amount of prefabrication, a great volume of welding had to be performed by men on the job. The contractor's original order for welding electrodes amounted to 8 tons, and this quantity was increased by supplemental purchases during the course of the work to about 12 tons.

To keep up the pace of progress on field-fabricated connections in process lines, the contractor maintained about 30 welding machines in continuous service. Two shifts of welders were employed whenever they could be hired. Because of the rigidity of the tests of welding operators by the Standard Oil Co. of Louisiana, the job never had an excess of welders. At the peak, 50 welders were working, but ordinarily the number ranged between 30 and 40.

All pipe connections were made with butt-welded V-joints. When making a connection in 10-in. I.D. pipe requiring at least three passes or more, with the pipe on rollers for down-hand welding, a welder could complete the joint in 1 hr. 15 min., although the same weld under similar conditions sometimes would take as much as 2 hr. A great part of the welding, of course, had to be done in the air, under much more difficult conditions.

Tower Erection

To erect tall towers up to 120 ft. high, the contractor used a guy derrick of 35-ton capacity with a 125-ft. mast and a 110-ft. boom. Other equipment and structures of lesser height were erected by four crawler cranes. For handling pipe and smaller process equipment, the job operated eight versatile winch trucks.

Concrete

Total concrete quantities of 30,000 cu. yd. required for the three butyl rubber units included a number of pours ranging from 300 to 1,000 cu. yd. each. In the reinforced concrete mat for the large compressor house, three sections of 1,000 yd. each were placed monolithically. At other places on the job, many monolithic units of 300 to 400 cu. yd. were concreted in continuous operations.

About half the concrete for the project came from an outside mixing plant. Truck mixers of 2-yd. and 4-yd. capacity hauled ready-mixed concrete from this plant to

(Continued on page 122)

Alaskan Proving Ground — for POST-WAR



Shaping a shoulder on a stretch of the Alaska Highway. The International TD-18, with 8-yard scraper, is operated by Leo C. DuChamp, Thief River Falls, Minn.

Right Now It's a Mighty Military Road that INTERNATIONAL TracTracTors Helped Build

IF EVER a highway earned the right to be called a proving ground, the Alaska Highway has done so. Only the toughest road-building equipment got the call when construction began. Only the toughest equipment stayed on the job through the grueling months that followed. Tractors and trucks, scrapers and graders, and the men who ran the show, made road-building history on this great construction job. Here was a proving ground dedicated to Victory, destined to influence post-war construction and REconstruction.

The Alaska Highway is a mighty military road now, a road that International TracTracTors helped

build. This assignment is only one of many that these powerful crawlers are taking in their stride. Tens of thousands of war-gearred Internationals serve in all branches of the Armed Services . . . as prime movers of big guns, smoothers of bomb-torn landing fields, clearers of jungle.

When it's time to carry on beyond Victory, Internationals will be readier than ever to tackle the toughest jobs of peacetime. Count on International Power then . . . to help *rebuild* the world.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL POWER

BEFORE, DURING & AFTER!

BEFORE

the war, NOVO pumps, hoists, engines, generators and pavement breakers were engineered and built to do their job well — on day in and day out performance.

DURING

the war, NOVO ruggedness is fully meeting the increased demands of war and our equipment is serving in every war theater. Emergency production is teaching us new skills which will be a part of the post-war NOVO equipment.

AFTER

the war, we will be in position to deliver NOVO equipment without your having to wait for time-consuming factory change-over. Because, standard NOVO products were found to satisfy war requirements, making drastic changes unnecessary. That puts you in position to get, from NOVO, the things you need to speed up such construction which will follow closely on the heels of peace.

We are in production on some types of equipment for civilian use on essential work. Tell us what you need NOW in the way of pumps, hoists, light plants, pavement breakers and engines.

NOVO
ENGINE COMPANY

Engines
Pavement Breakers



Diaphragm and Pressure Pump



Light Plants



Hoists



Self-Priming



Pavement Breakers



Engines



(Continued from page 120)

the job. The remainder of the concrete was produced on the job by a $\frac{3}{4}$ -yd. mixing plant which charged $1\frac{1}{2}$ -yd. transport mixers of bathtub type carrying two batches per trip to various distribution points on the site.

Subcontractors

Grading of the site for the three butyl rubber units required about 125,000 cu. yd. of earth-moving. Of this amount, about 40,000 yd. was borrow material hauled in from a nearby grading project. Cuts were shallow, being only about 2 ft. deep, but fills in bayous and depressions ranged up to a maximum of 21 ft. The Carruth Contracting Co., Inc., Baton Rouge, La., graded the area with tractor-scrappers, draglines, trucks, bulldozers and sheepsfoot rollers.

Nearly all the structures are supported on reinforced concrete footings resting on good clay soil of 4,000-lb. bearing value. In the area of heavy fill, creosoted timber piles were driven to support certain structures such as the expansion of the finishing and storage building.

Concrete was supplied by the Anderson-Dunham Concrete Co., Inc., Baton Rouge. The great quantity of high-temperature and low-temperature insulation for process equipment and piping was installed by Taylor-Seidenbach, Inc., New Orleans. Cyclone fencing was erected by the manufacturer, and the Chicago Bridge & Iron Co. assembled Hortonspheres of 1,500- to 12,000-bbl. capacity for storage of feed stocks, intermediate stocks and finished product.

Progress

During most of the construction, the job worked on a schedule of two shifts a day, six days a week, the first shift from 7:30 a.m. to 5 p.m. and the B shift from 5 p.m. to 2 a.m. In rush periods, the contractor employed skeleton crews, and sometimes full crews, on Sunday. Maximum employment on the two shifts was 1,600, and this number would have been employed consistently during most of the job if sufficiently rapid deliveries could have been made of critical items such as prefabricated piping, pressure vessels (including towers, drums and heat exchangers), steam turbines and pumps (either steam or electric powered). Deliveries of electric motors and equipment caused no slowing of progress. Average employment on the job was about 1,250 men.

Construction of the first butyl unit started in December, 1941, and the plant went into operation for the Rubber Reserve Co. in March, 1943. The contractor broke ground for the two other units in

(Continued on page 124)

PARSONS



TRENCHERS Speedily Build Home Defense

Long, wide crawlers, three point suspension, overload clutch, two speeds on buckets and conveyor along with 16 digging speeds are a few of Parsons' Trenchers outstanding features.

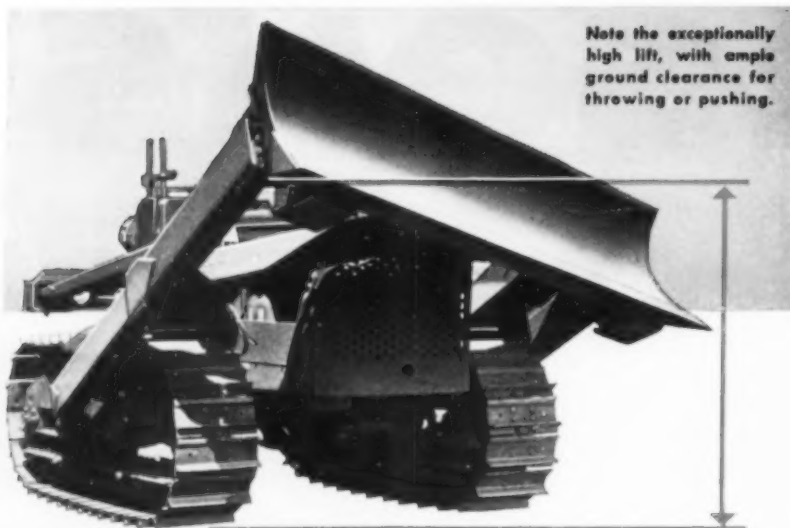
Finishing ahead of schedule means only one thing—SPEED. That's how the Parsons' Trenchers have built and will continue to build a home defense that will not be penetrated by the enemy.

With sixteen digging speeds ranging from eleven to thirty-nine inches per minute how could they help but be a home defense weapon. Add to this sixteen forward speed changes and four different reverse accelerations. The traveling speed of these rugged metal soldiers is one and three-fourths miles per hour. An added speed feature is the two speeds on the bucket line. For SPEED as well as clean and deep digging, Parsons has been the accepted standard for over thirty-five years.

THE PARSONS COMPANY • NEWTON, IOWA

TRENCHING EQUIPMENT





Note the exceptionally high lift, with ample ground clearance for throwing or pushing.

For Positive Action ✓ Smooth Performance ✓ Minimum Maintenance ✓ Full Visibility ✓ Efficient Teamwork.

The Heil Co.
announces new

Cable Dozers

for International
Harvester TracTracTors



HEIL CABLE DOZER WITH TRAILBUILDER BLADE

Heil Power Control Unit gives Cable Dozers quick, positive, smooth cable control — with little effort. Simple, dependable, troublefree. Levers adjustable to suit operator's reach.

**SEE YOUR
INTERNATIONAL
TracTracTOR
DISTRIBUTOR**

Designed to work together—through cooperation of the International Harvester and Heil Co. engineering departments — the International Harvester TracTracTor and this new Heil Cable Dozer provide a perfectly balanced team.

The Cable Dozer "looks right" on the tractor — and it does not distort or unbalance the operation of the tractor one bit more than its compact, trim, modern appearance suggests. Simplified mounting avoids obstructing operator's view — gives him full, free vision ahead. The machine "feels right" — performs smoothly, gives fast, positive action under the toughest conditions.

Trailbuilder Blade and "A" frame are interchangeable with the Bulldozer blade and frame. Rugged construction assures long, trouble-free life . . . Ask your International TracTracTOR Distributor for further details.

Write for free bulletin **R-14**



GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

(Continued from page 122)

February, 1942, and operation of these units is expected to start during the summer and early fall.

Management

For the Defense Plant Corp., construction of the three butyl rubber units is under the direction of R. E. Burton, division engineer, synthetic rubber division, Washington, D. C., with L. J. McHugh as division engineer in charge of the Louisiana area, Baton Rouge, and H. J. Malochee, as supervising engineer at the site. The Standard Oil Co. of Louisiana, which operates the completed plants, is represented by J. P. Warner, superintendent, chemical products division, with R. D. Patch, assistant superintendent, in immediate charge of work on the government-owned plants.

As architect-engineer for DPC, the Standard Oil Development Co., a subsidiary of the Standard Oil Co. (New Jersey), worked out the process design for all three units and prepared the engineering plans and specifications for unit No. 1. The Stone & Webster Engineering Corp., Boston, construction contractor for all three units under contract with DPC, did the re-engineering necessary in modifying and expanding the original plans to fit the enlarged and altered requirements of units No. 2 and No. 3. At the site, construction is directed for Stone & Webster by J. M. O'Haher, general superintendent; S. A. Peters, assistant general superintendent; and G. H. Hill, superintendent in charge of units 2 and 3.

With a 30,000-ton butyl rubber plant constructed at Baytown, Tex., for operation by the Humble Oil & Refining Co., another member of the Standard Oil group, the total production of this type of synthetic rubber amounts to 65,000 long tons per year and accounts for more than 8½ percent of the government program.

★ ★ ★

THREE-WAY POST-WAR PLANNING

(Continued from page 71)

crease its efficiency. Increase of efficiency not only gives greater value to the public for its investment in construction. Lowering of costs tends to increase the volume of construction, and will put the

industry in a better competitive position for obtaining its share of invested funds. Greater efficiency has been recognized as a means for attaining greater volume of business, and of providing a greater total volume of employment.

The National Level

The adoption of sound principles and objectives has been the first and the fundamental step on a national basis for the association's work in planning future construction markets. The principle and objectives were necessary so that all association members and chapters and the national staff might work toward the same goals. In most respects the work of the national association in planning is simply a continuation of what it has been doing all the time. One of the primary purposes for which the A.G.C. was founded, and for which it has worked since 1919, is the protection of the legitimate market for general contractors. No actual planning of projects is being done by the national association. Its primary purpose is to be the vehicle through which general contractors can cooperate to work for the economic climate in which they can flourish individually.

Without going into details, the functions the national association is planning can be summarized as follows:

- (1) To cooperate with other branches of private enterprise to work for policies of the legislative and executive branches of the federal government which are most favorable to private enterprise.
- (2) To work for federal policies most favorable to the general contracting industry.
- (3) To work with the national organizations of other industries to aid in the development of all forms of private enterprise.
- (4) To cooperate with other national organizations in the construction industry to improve relations within the industry, and to aid in the plans of other groups.
- (5) To encourage the preparation of plans and specifications for federal public works projects which will be beneficial to the general contracting industry.
- (6) To make studies and provide information to A.G.C. members and chapters on volume of markets and the many factors which influence construction operations.
- (7) To serve as the medium for inter-

(Continued on page 126)



Heil Hydraulic Bulldozer —tailormade to Cletrac Tractor

... gives you full visibility, perfect balance,
the rugged strength suggested by its
clean, modern appearance

Sensitive Heil Hydraulic System gives fast, accurate control over blade

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Trailbuilder blade readily angled to right or left for side-casting in new cuts. Bulldozer blade

takes rocks and stumps without waver.

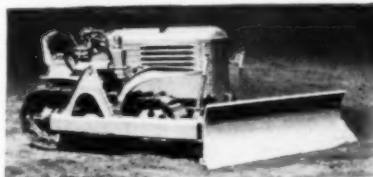
The hydraulic control is positive and accurate in all positions — makes this the ideal machine for clean-looking jobs of finishing or landscaping that you can be proud of.

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FOR CLETRAC TRACTORS, MODELS A, B, D, F

Trailbuilder blade and "A" frame are interchangeable with the bulldozer blade. Low hydraulic pressure is possible because of the large diameter hydraulic cylinders. R-15



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(Continued from page 125)

change of information between chapters and members.

(8) To continue to promote at all times to prospective purchasers of construction the advantages of construction by general contractors.

These functions call for activities on a broad scale by the national association. Thousands of individual tasks can be undertaken. In all of its actions the national association keeps clearly in mind its aim to bring about the conditions on a national scale which are most favorable for the functioning of private enterprise and the general contracting industry.

Contacts are being maintained with the Committee for Economic Development, the United States Chamber of Commerce, the American Trade Association Executives, the American Society of Civil Engineers, the American Institute of Architects, the Producers Council, and many other organizations.

Chapter Activity

The purpose of this article is not to discuss the activities of A.G.C. branches and chapters, but it is recognized that their activities are essential to the work of the association. The functions of the chapters and branches are essentially the same as those of the national association, and for them also planning activities are actually a continuation of their normal work. They are active to varying degrees on planning work, which now has a place of high importance on the program of the A.G.C. Secretaries Council, of which R. J. Hendershott, manager, Associated General Contractors of Minnesota, is chairman.

Individual Responsibility

The national association recognizes clearly that no matter how much work is done on a national, regional or local scale to bring about conditions favorable to the general contracting industry, the individual general contractor is the one who must actually plan to obtain and carry out his own work. Individual initiative is the mainspring of private enterprise. The A.G.C., nationally and locally, can help create a favorable economic climate, but the extent of the development of future construction markets will depend on the degree to which each general contractor uses his ingenuity to develop business for himself.

Three Periods of Future Markets

The A.G.C. in its work has chosen the phrase, "planning future construction

(Continued on page 129)

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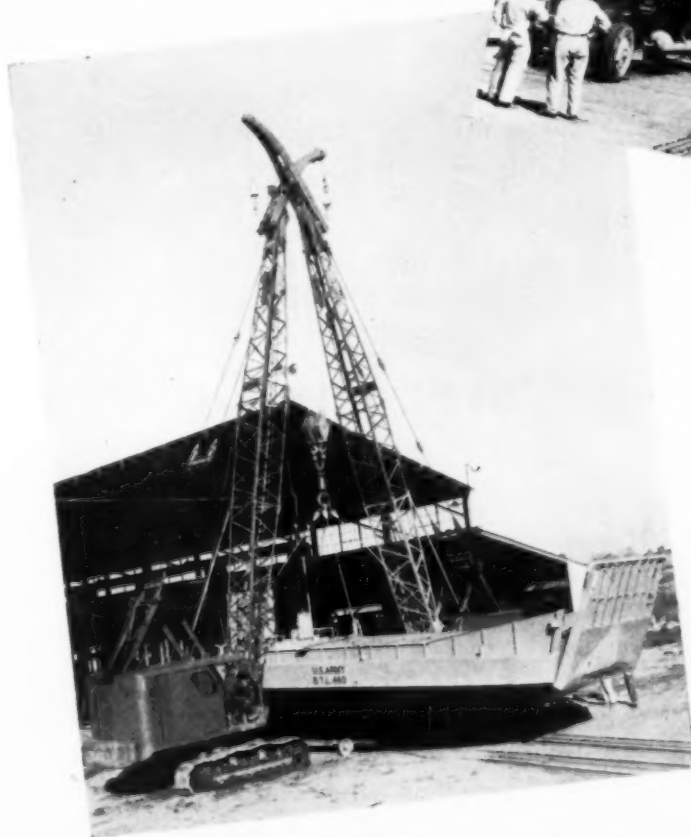
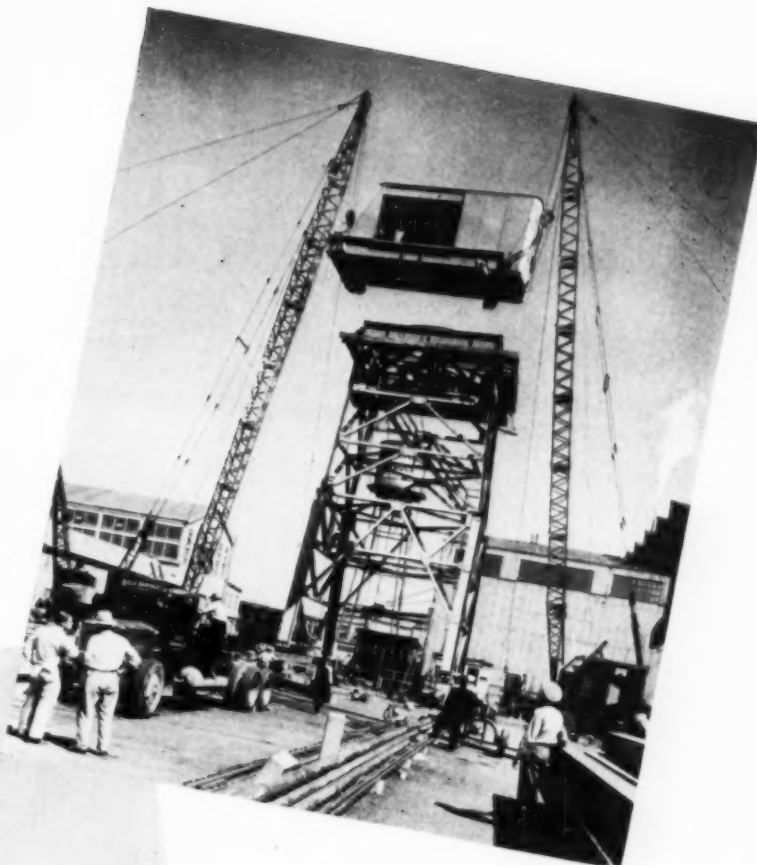
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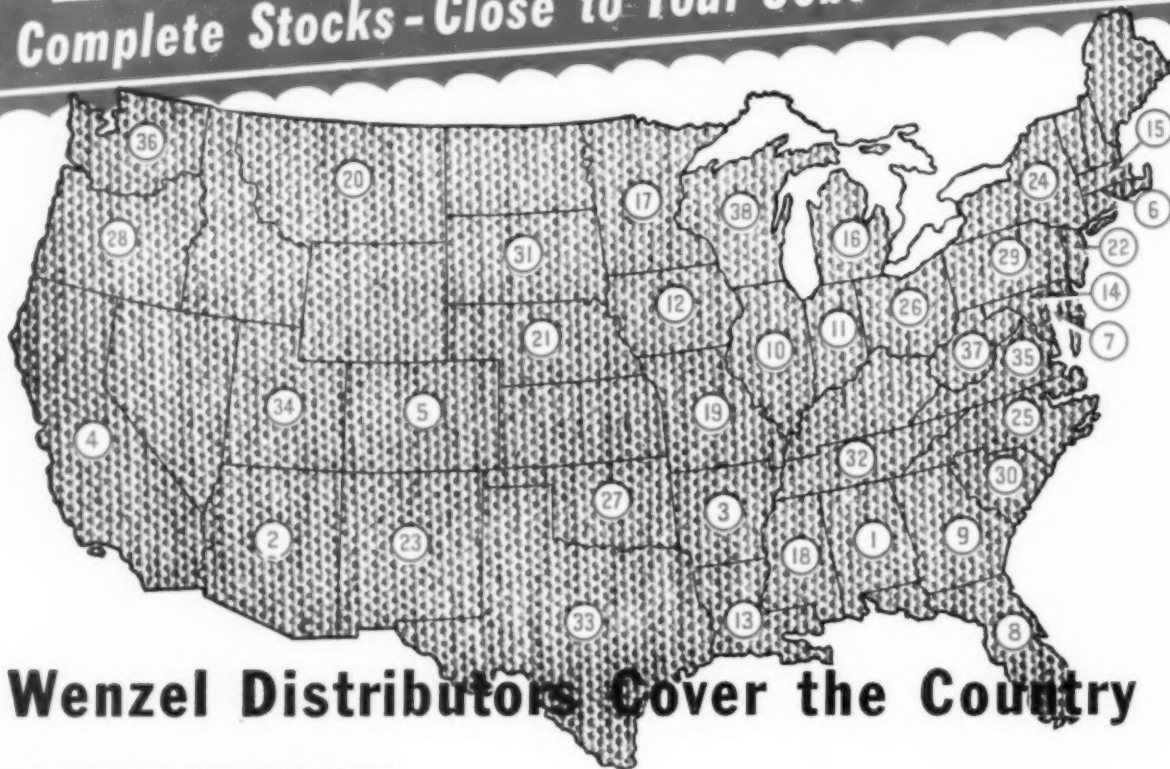


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C. D. Franke & Co., Inc., Charleston |
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Van Camp Hardware & Iron Co.,
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The Dakota Iron Store, Sioux Falls |
| 12—IOWA
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COMPANY



(Continued from page 126)

markets," to emphasize the fact that planning for the future in construction is not confined to planning for the post-war period. Construction was one of the first major industries to swing into action on its tremendous war job. It drove ahead so fast that it is now one of the first major industries to be completing its war production. For construction, in a sense, the post-war era has arrived, so that the planning of future markets for the industry includes planning of markets to be developed immediately.

The periods of future markets for the industry are essentially the following:

- (1) The present period, which will continue for the duration of the war.
- (2) The readjustment period immediately following the end of the war when men will be returning from the armed services and war industries will be re-converting to peace time work.
- (3) The period of opportunity when the aim of all will be the development of a greater nation.

Present Period—Many general contractors already have turned to other types of war production, in which they are making outstanding contributions to the war effort. Others may be expected to do the same. That is one way to develop markets, and to keep organizations intact for the return of peace time work. With the passing of the peak of war construction, the A.G.C. has urged that contractors with excess capacity seek maintenance work on highways, war plants, and other facilities needed during the war. The reasons for this are chiefly two:

First, construction contractors and their employees are able to make most efficient use of manpower in maintenance operations, thereby freeing other men for other types of production.

Second, engaging in maintenance serves to keep construction organizations together, even if on a reduced scale, so that they will be able to turn quickly to peacetime work after the war. Further, these construction organizations provide a standby service ready to repair damage to necessary facilities caused by sabotage, flood, fire or other catastrophes.

Readjustment Period—In the readjustment period, construction will be one of the major industries able to turn quickly to peace-time work. Because of this ability it will be looked upon to help stabilize

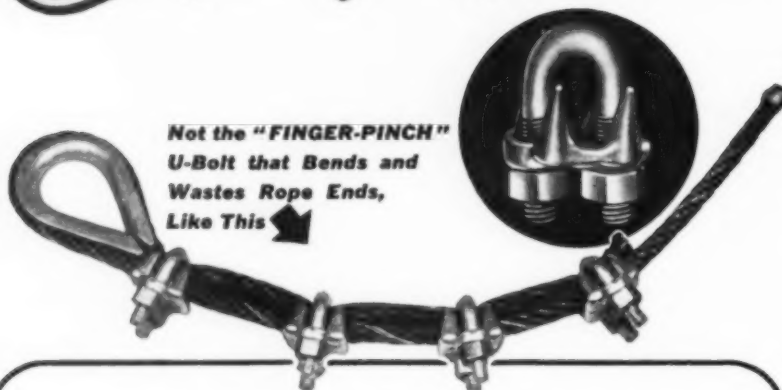
(Continued on page 130)

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Use the "FIST-GRIP"
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Not the "FINGER-PINCH"
U-Bolt that Bends and
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NOTE: The photographs of wire rope assemblies shown here are exact representations of two 3/4-inch ropes fitted with recommended number of clips; all nuts on both wires uniformly tightened with indicating wrench. When "Fist-Grip" Clips are used, rope remains straight, whether or not load is applied.

Congratulations to you wire rope users cooperating with wire rope companies in Victory Rope-Saving Drive!

Laughlin "Fist-Grip" Safety Clips fit right in with your program. Don't risk wasting rope with bending, warping U-bolts.

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Save rope—clips—time—money—man-power—starting now!

**THE THOMAS
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(Continued from page 129)

employment during this period. The A.G.C. foresees three dangers which can face the industry during that period: One is that more persons will look to construction for employment and more construction may be undertaken than the industry can handle efficiently. This will lead to day-labor methods of construction. Second, so much construction could be undertaken that it would destroy the proper balance of construction with other industrial activity which makes prosperous conditions in the country. Third, political forces may wish to undertake construction for employment so rapidly that they would dispense with plans and specifications and orderly contracting methods. Adequate and complete advance engineering, plan making and specification writing constitute the one insurance policy available.

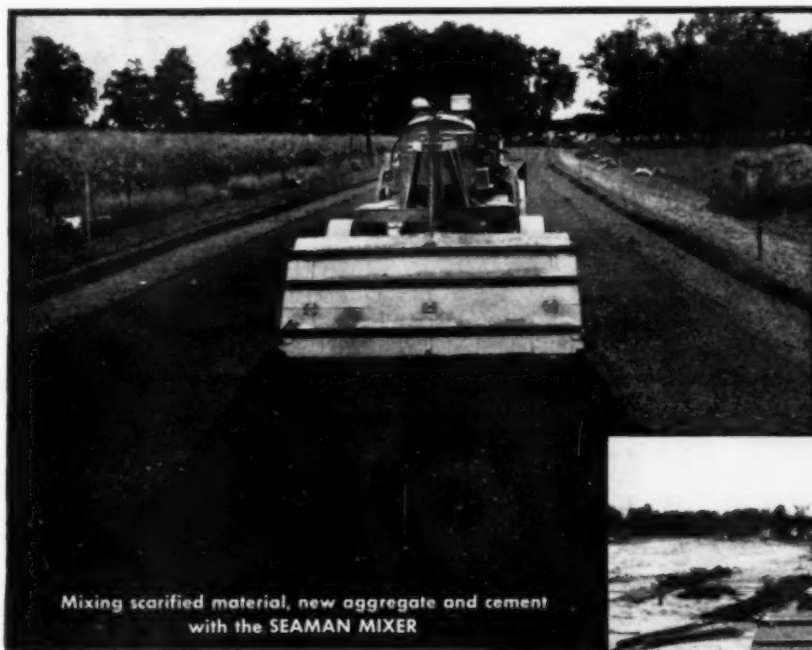
Period of Opportunity—The chief difficulty for construction in the period of opportunity for the nation is one which it will share with all industry. The difficulty will be not in attaining, but maintaining, a market which will sustain a high level of employment. The cooperation of construction with all other industries will be particularly important during this period. During this period, one of the most important things for the country will be one of the most intangible: a faith, or confidence, in the future of the nation.

Blueprints and Specifications Now

By the nature of the industry, the general contractor is not the one who actually plans or decides that a specific construction project shall be undertaken. While the industry cannot, as a general rule, initiate new projects, there is much that the industry and the individual contractor can do in advising future clients on how to obtain the greatest value from their construction work.

The recommendation which the general contracting industry makes to all public and private organizations who will need construction is to start immediately the preliminaries necessary for orderly and sound construction work. The A.G.C. urges that detailed plans, blueprints and specifications be drawn, that sites and rights of way be procured, and that financing be arranged so that bids can be advertised or contracts awarded the day that the peace treaty or armistice is signed. The association believes that there is enough deferred public and private construction, not undertaken because of the war, to provide a large volume of work as soon as the war is over

(Continued on page 132)



Mixing scarified material, new aggregate and cement with the SEAMAN MIXER



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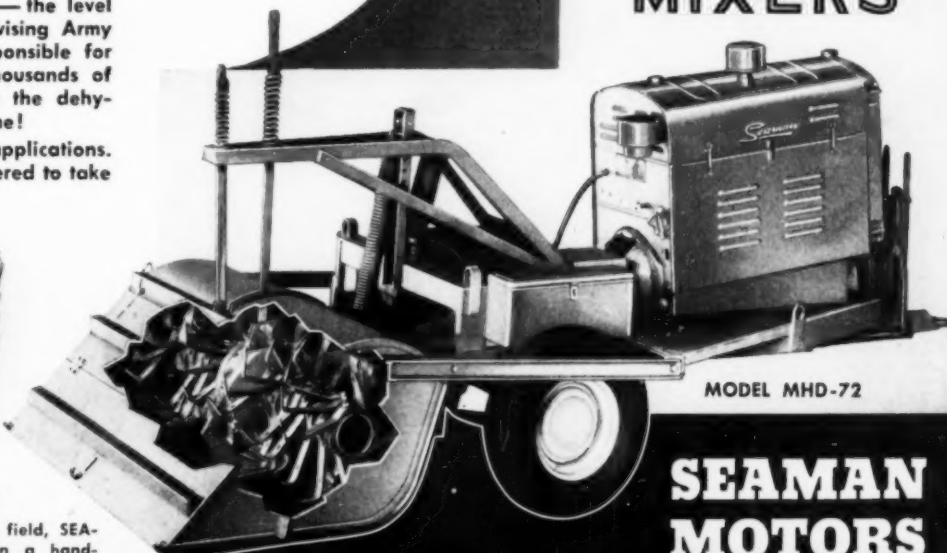
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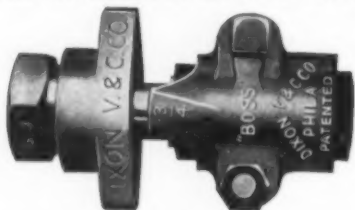
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Keep hose connections tight . . . keep the lines free from slow-downs and shut-downs . . . with these strong, washerless, leakproof couplings. Ground joint construction insures a permanently efficient, soft-to-hard metal seal between stem and spud. "BOSS" Interlocking Clamp anchors coupling to hose with powerful, full-circumference grip. No washers to replace . . . no danger of blow-offs. Compact Type, Style XLB-61, 1/2" and 3/4". Heavy Type, Style XHB-72, 3/4" and 1".

Note: For washer type couplings of otherwise same design, specify:

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(Continued from page 130)

or as soon as other conditions permit its undertaking, and that the actual preliminaries of engineering surveys, preparing of blueprints, financing and purchase of land can be started now without any detriment to the war effort.

If other than chaotic conditions are to prevail in construction immediately after the war, such preliminary work is essential. The association believes that adequate and complete planning in advance of the contract-letting stage is the one guarantee that the industry will be able to function efficiently during the readjustment period following the war. As the association sees it, this volume of work will be ample to carry the industry during the time when projects are being planned for the period of opportunity to follow the readjustment.

Private Markets

The field of privately financed construction is where the individual general contractor has the greatest opportunity to develop his own market. This is partly because the volume of privately financed construction is expected to be the largest after the war, and because, by the customs of the industry, each contractor creates his own contacts with private investors in construction. Even though the war stimulated the construction of both publicly and privately financed manufacturing facilities, there are reasons to believe that the keen competition now being anticipated by many manufacturers will create the demand for a large volume of industrial construction and modernization.

With an expanding domestic economy, which is the aim of planning by such organizations as the Committee for Economic Development, a large volume of commercial construction can be expected. Reliable estimates have been made that residential construction can and should go on at a greatly accelerated rate for the next 25 years. The fact that an expanding national economy resulting in a high level of employment would create a yearly volume of construction greater than was executed during the peak of war construction, emphasizes to the general contracting industry the value in its co-operating with all forms of private enterprise to bring about these conditions.

Public Works

The Market Development Committee has recommended and the Governing and Advisory Boards have adopted the principle that the A.G.C. promote the construction of public and private projects needed and necessary from the standpoint

(Continued on page 134)

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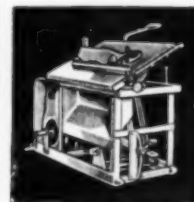
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4

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That's the whole story in a few words. Surely no hardheaded and patriotic equipment user needs to be SOLD on the urgent need for "doing the most with what we have." If you're using Reliance Products and repairs DO become necessary, you'll find their rugged simplicity a big asset in such work. There's nothing complicated or hard-to-fix about Reliance Equipment. The same construction that makes them stand up on the job makes them easier to fix. Don't wait for breakdowns. Go over your equipment NOW and you'll be well repaid for your time and trouble.

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If you're using Reliance products, tell us which ones and we'll be glad to advise you how to stop trouble before it starts. This service creates no obligation on your part. Write us today.

RELIANCE PRODUCTS

Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY CO.

Kingston, N. Y., U. S. A.

DISTRIBUTORS IN ALL PRINCIPAL CITIES OF U. S. A.

(Continued from page 132)

of utility and general cultural value. Stimulating the planning and construction of public works is better adapted to group efforts than the planning and construction of privately financed projects. Already many A.G.C. chapters are active in their states and local communities, urging the planning of needed and useful public works. The A.G.C. has taken the stand that federal funds should be available to states and local communities where necessary to stimulate the preparation of plans and specifications for post-war public works projects.

During periods of high industrial activity, useful and needed public works provide approximately one-quarter of the annual construction volume. If a greater percentage of the construction volume after the war is required in public works, the best interests of the nation will be served if these public works projects have been carefully surveyed and planned so that contracts can be awarded as soon as necessary. Before the '30s the great bulk of public works construction came from state and locally financed projects, and these provided a far greater volume than the federally financed or federal-aid projects constructed during the last decade. The self interest of the industry lies in encouraging a greater volume of locally financed projects. The type of public works projects which the association recommends most strongly are those which stimulate private enterprise. New highways which speed the movement of traffic into and out of cities are an example.

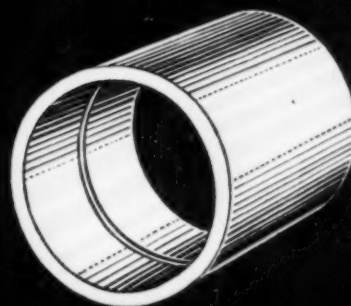
Conclusion

The activities of the national A.G.C. are based upon the conviction that no agency in Washington or elsewhere has the omniscience to know what is the best thing to be done in each local community throughout the nation. They are based on the belief that the greatest development of the nation, and the greatest opportunities for each individual, will come about through the exercise of his own ingenuity in his own community. They are based on the belief that private enterprise can and will accept the responsibility for taking the leading part in the future development of the nation.

The purpose of the activities of the national association is to provide the assistance which must be given on a national scale to helping bring about the economic conditions in which the general contracting industry can flourish to its fullest extent; and to provide assistance to its chapters and individual members in their efforts to stimulate the planning, in advance of the contract-letting stage, of needed and necessary publicly and privately financed construction projects.



You can replace your worn-out suit in 15 minutes...



...but it may take weeks to replace a ruined wrist pin bearing

The answer is Preventive Maintenance now with Shell Diesel Lubricants

SHELL



BEARING METALS are as "precious as gold" these days. Yet, in spite of their scarcity, there are Diesel operators who are trying to stretch their oil for "another few hundred miles" in order to save the few minutes it takes to change to fresh oil.

Those few minutes "saved" can turn into days wasted when a tractor, truck or shovel stands idle, waiting for a new set of bearings to be delivered. Many of these costly delays can be prevented by proper attention to lubrication. This includes a more careful selection of lubricants... more frequent check up periods. These more frequent check-ups may take a little longer, but those few extra minutes spent now will pay you big dividends in the time and money they'll save you later.

Don't wait for trouble to remind you that you should gear your maintenance procedure to wartime tempo. Call the Shell man now. Let him help plan your Preventive Maintenance.



First oil refinery to win Army-Navy "E" — Shell's Wood River Refinery

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AND SHELL "DIESELINE"**

You scuttled a Nazi Ship of

Hate



Men of Denmark, they never knew you . . . the iron in Danish hearts. Your native spirit flourished under Nazi-imposed "self-rule." Then you struck . . . a vital blow for the rebirth of a free Europe.

Your reward will come . . . as fast as your Allies can reinforce your blazing courage with great, victorious armaments that have their birth deep in pit, mine and quarry, where rugged men, using Ensign-Bickford Safety Fuse and Primacord-Bickford Detonating Fuse, make explosives produce amazing quantities of war-destined materials.

Victory Begins Underground!

THE ENSIGN-BICKFORD CO.
Simsbury, Connecticut


Primacord-Bickford
Detonating Fuse

K-P



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Tanks produce results only in actual combat on the firing line.

To conserve their fighting capacity they ride to battle on Rogers Trailers,

or if damaged are transported to the rear for repairs on a retriever type of trailer especially equipped to load disabled tanks.

Meanwhile, thousands of standard Rogers Trailers are serving efficiently on our factory fronts or in transporting defense equipment to various fortifications.



ROGERS
LOW BED -
HEAVY DUTY
TRAILERS

★
ROGERS BROTHERS CORP.
ALBION, PENNA.

NORFOLK DAM

(Continued from page 80)

likewise are delivered by conveyors from the gravel processing system to separate bins over the batching tunnel.

Rock Production—At the rock quarry, both coyote holes and well drill holes have been used for blasting. Coyote holes have been loaded with black powder and dynamite, while the standard explosive for the well drill holes has been Atlas and Hercules dynamite of 50 percent strength in 5-in.-dia. packages. The heaviest blast used 70 tons of explosive. Consumption of explosives has averaged about $\frac{3}{4}$ lb. per cu.yd. of rock.

At present, only well drill holes are being employed for blasting. The Goodwin Drilling Co., subcontractor, puts down 6 $\frac{1}{4}$ -in.-dia. holes with four churn drills, two Bucyrus-Erie and two Star, mounted on trucks. The drilling progresses at a rate of about 4 ft. an hour; with allowance for time lost in moving, each rig averages 25 to 30 ft. in 8 hr. A recent blast with 5-in.-dia. dynamite cartridges in well drill holes involved 167 holes 20 to 30 ft. deep, loaded with 46,000 lb. of dynamite. All blasts at the quarry are fired with Primacord detonating fuse.

Blasted rock is loaded by a Bucyrus-Erie 2 $\frac{1}{2}$ -yd. shovel into Euclid 10-yd. trucks which dump the material into the primary crusher. Oversize chunks which refuse to pass through the machine are drilled and shot in the crusher. The crusher is screened to prevent rock fragments from flying. Processing of the rock aggregate and rock dust is indicated on the flow chart.

Batching System

Over the batching tunnel are separate stockpiles for five sizes of aggregate and a silo for dust storage. In the tunnel, under each of these units, is a Johnson automatic weighing batcher equipped with a Kron scale. An extra batcher installed under the sand bin has been seldom used. The batching tunnel, nearly 460 ft. long, of elliptical section, with dimensions about 11x13 ft., is lined with Dixie corrugated steel plate.

Batcher discharge doors are operated by electrically powered air rams which are controlled by pushbuttons on a batching panel in the mixing plant. Colored lights on the panel indicate to the operator when a batcher is completely empty, when it is in process of being filled, and when it is full. As soon as the discharge doors of an empty batcher are closed by pushbutton control from

(Continued on page 138)

3-WAY SERVICE

TO MEET YOUR REQUIREMENTS

BRING IN

Here is a **PROVED** better, faster, more economical service plan. By handling the hauling of your own outfit to and from the dealer's shop... you save time waiting for it to be picked up and delivered. You cut the cost of repairs, too... by having your operator bring in the machine. He can "pitch in" and help speed the job along... and learn plenty about the care and maintenance of the outfit. He can also act on your behalf when unforeseen problems arise.



PICK UP

At all times your Allis-Chalmers dealer has gone "over-board" to serve you. Even under wartime conditions he is doing a *mighty fine job*. Unusual war demands may sometimes prevent his giving you the usual pick-up service... but rest assured he will do his best. It will help if you can anticipate your needs — let him know ahead of time approximately when you want him to call for your outfit. If it is at all possible, he will be there. Be sure to instruct him clearly as to what you want done... and your unit will be repaired exactly as you want it.



ON THE JOB

You'll find your Allis-Chalmers dealer well equipped for field repairs. His service cars have time-saving tools for every emergency... operated by field mechanics highly skilled in their work. After a diagnosis of the trouble... your unit will be quickly put back in operation if it is only a matter of making adjustments or minor repairs. When major repairs or a complete overhaul are necessary it is best to have the work handled in the dealer's shop — where the necessary parts and proper tools are available.



No matter which of the three ways you want your repairs handled, you'll find your Allis-Chalmers dealer fully cooperative. It will pay you many times over to deal with him — for high quality work, quick service and greater economy.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE, U. S. A.

JOIN THE INVASION... BACK THE ATTACK... BUY MORE WAR BONDS

INCOMPARABLE



STAMINA



Ability to stand up under the toughest service ever encountered is characteristic of Owen Buckets.

Exclusive features—scientific designing—protected working parts—efficient lubrication—combine to assure the exceptionally long life for which these buckets are noted

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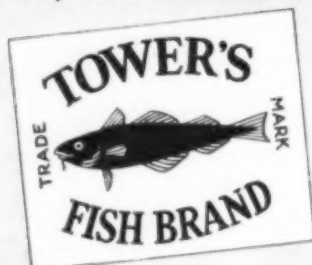
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OWEN BUCKETS

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LIMITED SUPPLIES of TOWER'S OILED SUITS, COATS and HATS HAVE BEEN ALLOTTED to MOST DEALERS. WE URGE that EVERY EFFORT BE MADE to

'PRESERVE YOUR SLICKER'

Write for our FREE folder giving valuable tips on how to do it.

ASK FOR SPECIAL FOLDER CM

FULL SUPPLIES OF TOWER'S OILED and LATEX TREATED WATERPROOFS WILL BE AVAILABLE AFTER VICTORY

A. J. TOWER CO. BOSTON, MASSACHUSETTS

(Continued from page 136)

the mixing plant, the batcher automatically weighs out the next batch.

Weighed materials for a 4-yd. batch are discharged by the six batchers in the tunnel on a 42-in. by 572½-ft. belt conveyor which delivers them to a central charging hopper above three concentrically arranged 4-yd. concrete mixers in the mixing plant. Cement and water for each batch are measured by weighing batchers located within the mixing plant itself. During the summer months, about 100 lb. of ice per cu.yd. is added to the mix in lieu of water. The ice is crushed and discharged on top of the aggregate on the batching belt.

A continuous record of all batch weights and batching operations is automatically inscribed on a moving sheet of graph paper by a Johnson autographic recorder inclosed in a glass-panel box in the operator's control room of the mixing plant. Individual pens electrically interconnected with the batchers trace the weight curves for the various materials on the moving sheet of graph paper, which is marked to show the time of each batching operation. The recorder also registers on the sheet the consistency of each batch of concrete, as determined by the location of the center of gravity of the mix in the drum. Consistency meters installed on the mixers work on a system of arms and knife edges similar to weigh scales. The weight on the back bearing of each mixer is recorded. Consistency of the concrete influences the position of the drum to a small extent, and this effect is indicated by the weight recorded for the back bearing. All features of the automatic batching apparatus were designed and made by the C. S. Johnson Co.

Cement Supply

Low-heat cement for the dam is supplied by the government. Hopper-bottom railroad cars unload the cement at the foot of a slope below the mixing plant into a receiving hopper above a Robinson air-activated conveying unit. The air-activated conveying system transfers the cement through a 6-in. pipe line 1,700 ft. long into a cement bin at the mixing plant. A vertical lift of about 425 ft., including a 100-ft. riser to the top of the mixing plant, is involved in the conveying line. Handling cement in shots of about 32 bbl. each, the system conveys 250 to 300 bbl. per hr. into the bin at the mixing plant. Air at a pressure of 85 to 90 lb. is used to operate the system.

To provide a reserve supply of cement, a 6,000-bbl. silo is located on the hillside about 700 ft. from the car unloading point, as measured along the conveying

(Continued on page 140)



1 Saves Vital Road Machines



2 Keeps Jobs on Schedule



3 Works in Wet Weather & Mud



ATHEY Forged-Trak Trailers conserve vital roadbuilding and road-maintaining outfits. It isn't necessary to construct smooth haul roads where these units are working. In itself, this is a saving of construction machines and manpower which are in great demand in the nation's Victory program.

Wherever it goes, the Athey Trailer lays its own smooth steel highway over which heavy loads roll easily and economically. Its broad tracks operate in soft mud, sand, snow, rock or loose earth, paying little regard for either footing or weather. There's no concentration of the load at one point — but rather a spreading of the weight over wide steel tracks. This provides support for the load in soft footing the same as snowshoes support the weight of a man. Athey Trailers maintain steady production no matter how tough weather or footing may be.

Check these many advantages with your Athey-"Caterpillar" Dealer today. Let him give full facts on the delivery situation of new Athey products. And always see your Athey-"Caterpillar" Dealer when you need repair service. Athey Truss Wheel Co., Chicago, Illinois.

ATHEY
Forged-Trak  *Wheels*
SURE TRANSPORTATION

(Continued on page 142)

How to Lick an Old Enemy!

KEEP ENGINES
FREE FROM
SLUDGE



HERE'S THE SECRET: Socony-Vacuum's Delvac Oils help keep sludge from forming in engines. Read below how this simplifies maintenance, saves contractors' time, helps you meet rigid wartime schedules.



DELVAC OILS save time for Contractors many ways!

Now, in wartime, sludge is a more vicious enemy than ever. Every engine that it clogs up, costs you precious time...makes it more difficult to meet schedules.

Socony-Vacuum's Delvac Oils are of the detergent type and fight sludge at its source...to *prevent* its formation. They hold—suspended in the oil in microscopic size—the products of combustion, so they *do not* tend to settle out and form deposits.

They also resist the formation of other oil-oxidation products "varnish," "lacquer" and gum—and

these heavy-duty oils give unusual protection to bearings in the most severe operations.

Your engines operate far cleaner, far safer than was possible with older-type oils. You have fewer overhauls and repairs and you save replacement parts and skilled manpower.

Call your Socony-Vacuum Man today. There are Delvac Oils for all automotive-type Diesels and gasoline engines in heavy-duty service.

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Get more **WORTH** from air with
WORTHINGTON

Buy Blue Brutes

Worthington Pump and Machinery Corp.

(Continued from page 140)

of the copings of piers 5 to 8 inclusive were too weak to carry the new loads and could not support the raising jacks. The wells of these piers were filled with concrete, the arched openings of the bents were filled, the columns and lower parts of the shafts were incased in concrete, and the pier extensions were made practically solid. The extensions to piers 9 and 10 were metal pedestals.

Jacking Operations

It was necessary to keep the truss bearings in the same relative position at all stages of raising to prevent overstressing the members. The raising consisted of jacking through short lifts of eight inches and then supporting the shoes on precast concrete crib blocks. The jacks were then placed on blocks and the operation repeated. After a reasonable height had been reached, concrete was poured around the blocks to stabilize them. The operations were repeated until the final elevation was attained.

The work required to reconstruct this bridge was done under contract by the Rust Engineering Co., Pittsburgh, Pa. Preliminary work was started about Jan. 1, 1943, and the job was scheduled for completion early in September. The photograph shows the gantry crane raising a span on the east approach viaduct.

★ ★ ★

PEACE RIVER BRIDGE

(Continued from page 62)

felt boots, 6 prs. heavy socks, 2 or 3 prs. heavy underwear, 2 wool shirts, sweaters, heavy coats, windbreakers, and caps with ear flaps. If they can find a parka, bring it; also leather mittens with removable wool liners."

Assembly of the erection tower began on March 2. It had a reach of 250 ft., sufficient to command the top of the highest tower, which is 196 ft. above the top of the pier. On March 5, the first column section for one of the main towers of the great bridge arrived at the site and, on March 25, the erection tower was slowly hauled across the ice, with the aid of four steam-powered derricks, to its first post of duty at the south pier. It was rigged

(Continued on page 144)

National Carbide FLOODLIGHTS

VALUABLE IN PEACETIME



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NECESSITY
NOW!

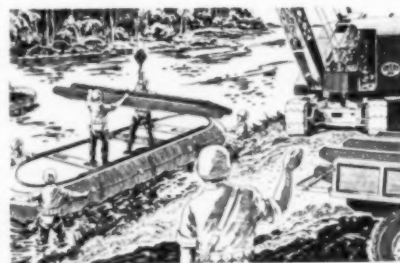
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Simple in Construction
Economical in Cost
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Available in 1500,
8,000 and 16,000
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Write today for literature
showing entire
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UNTIL THE LAST GERMAN CRIES "KAMERAD"

the U. S. Engineers need
BYERS cranes more than
civilians do . . . and the En-
gineers are getting them

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

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AND SHOVELS
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DISTRIBUTORS THROUGHOUT THE WORLD

HEAVY TIMBER FRAMING

*Now Faster.
Cheaper, Better*

—THANKS TO
HENRY MILL
METHODS



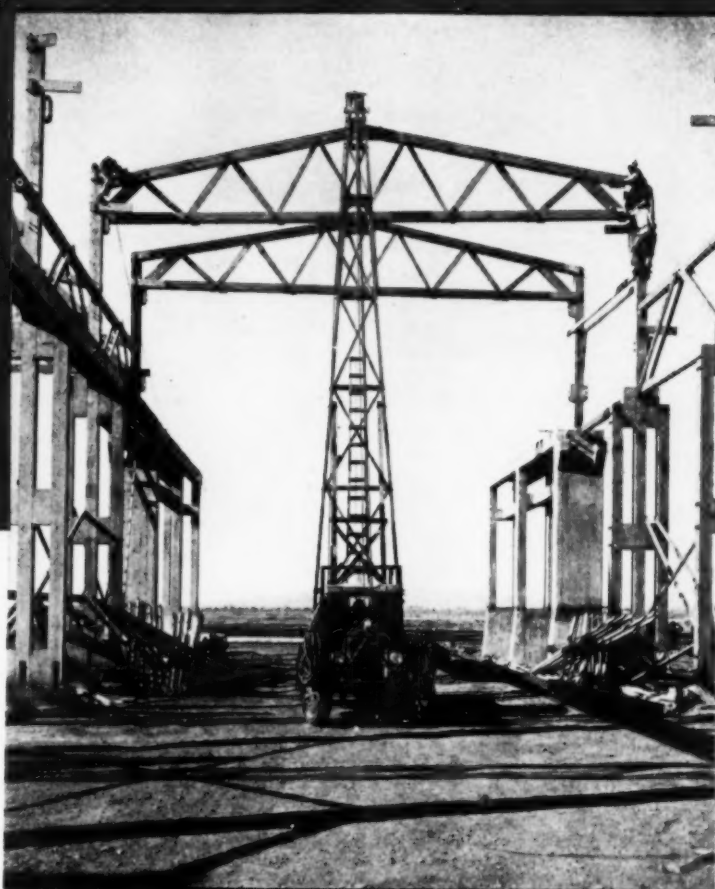
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A staff of engineers, thoroughly experienced in the use of wood for all structural purposes, is available to architects and engineers to help solve their particular structural problems.



2 MACHINE PRODUCTION — "Assembly line" production methods with specialized equipment enables the Henry Mill to fabricate heavy timber structures faster, cheaper, and with greater precision than is possible with hand-framing methods.



3 FOLLOW-THROUGH — Henry Mill accepts full responsibility for maintenance of production and shipping schedules—and for assembly and erection in the field where required. Henry Mill follows a standard procedure of periodic inspections and submits maintenance recommendations.



Showing Henry Mill equipment mounted on trucks at the Henry Mill building—127 & 129—Main Street, California. Erection completed in 24 days following delivery of fabricated members. The Henry Company, Contractor — A. B. Parker, Engineer.

SPECIALIZED wood engineering has brought wood the prime construction material... into a new era of usefulness. Machine methods of fabrication have brought new precision and economy to this field. Architects, engineers, contractors and owners are invited to write for free book—now on the press—giving full particulars of Henry Mill Methods, and details of many wood framing projects completed.

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The right grease in the right place at the right time is helping to keep both military and construction equipment working harder, longer hours. Graco Convoy Lubers are servicing both military and construction equipment all over the world. Mounted on trucks,

Convoy Lubers are able to follow rapidly moving military equipment, or keep up with the bulldozers and scrapers on the job.

Graco Convoy Lubers come equipped with heavy duty pumps which dispense track, gear, chassis, and hypoid lubricants at high speed through 30-ft. reel mounted hoses. A convenient 50-ft. air line services all size tires and can also be used for operating small pneumatic tools.

Increased production of Graco Convoy Lubers has made short time deliveries possible. A letter or wire will bring detailed information about these extremely useful field lubrication units. Ask for catalog No. 129.

GRACO
GRAY COMPANY, INC.
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In dirt, clay, coal, gravel or ore you can rely on one of the tough, properly designed, Brownhoist buckets to take a full load with every bite. Extra large sheaves reduce rope wear to a minimum. Brownhoist Buckets are available in rope-reeve, power-wheel and link type. For prices and further facts write INDUSTRIAL BROWNHOIST CORPORATION, Bay City, Michigan. Offices in New York, Philadelphia, Pittsburgh, Cleveland and Chicago.



BROWNHOIST BUCKETS
GIVE MORE YEARS OF
TROUBLE-FREE PERFORMANCE

(Continued from page 142)

up on a specially prepared skidway supported on piles. Then on the evening of March 27, the boom of the erection tower picked up the first steel section of the south main tower and seated it on the pier.

All operations in tower erection were conducted from the ice. After the south tower was completed in 3½ days, the rig was skidded across the frozen river into position for the north tower, which was erected in 4 days. Although there were several delays, the towers were put up in record time and just in time to avoid disaster. On April 5 the last section of the north tower was bolted into position and a Chicago boom was erected for dismantling the erection tower. In 5½ days of work and 9 days elapsed time, 700 tons of steel had been erected. Then, on April 11, the ice break-up began.

High-line cables were later strung between the tower tops for tramway cars which would work back and forth during the placing of the cables and reels of cable strand were brought to the south bank of the river to be set up on the unreeling spools. Hauling of the first bridge strand linking the north and south towers was accomplished on May 30. Additional

(Continued on page 146)



Faster CONTINUOUS Pumping under all conditions

Contractors standardizing on Gorman-Rupp Pumps are getting extra hours instead of costly shut-downs due to pump failures. There's a DEFINITE REASON. More dependable. No priming jet to clog. No control valve to jam. This is important today when every piece of equipment has to take a beating. Let your distributor show you why more contractors are switching to Gorman-Rupp's every day.

Distributors in more than 100 principal cities.

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GORMAN-RUPP
Self-Priming Centrifugal Pumps

YOU NEVER KNOW...
*When you'll
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**-IF YOU HAVE A
REAL ROCK SHOVEL,
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Buy **NORTHWEST**



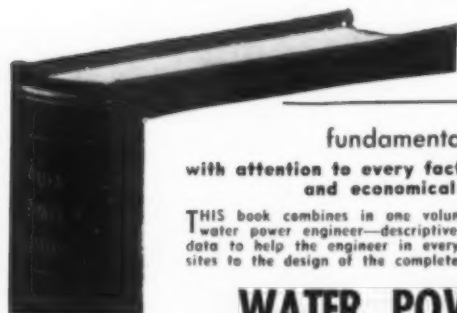
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These new Army Crash Trucks, equipped with HERCULES SPLIT-SHAFT POWER TAKE-OFFS simply blast away the flames and smoke.

We're proud to have a part in building a unit which will save the lives of many of our flying fighters.

HERCULES STEEL PRODUCTS CO.
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How to design water power systems



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a
thorough treatment
of
fundamentals—plant location and design
with attention to every factor important in developing efficient
and economical hydroelectric projects.

THIS book combines in one volume textbook and reference guidance for the
water power engineer—descriptive details and immensely valuable comparative
data to help the engineer in every step from the investigation of water power
sites to the design of the complete hydroelectric system.

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By H. K. BARROWS

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A sound, authoritative treatment of principles and practice underlying the de-
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(Continued from page 144)

strands were hauled across and fastened to the eyebars embedded in the concrete of the anchorages. Metal saddles on the top of each tower carried the strands of the cables and as each strand was adjusted it was set to proper sag by hydraulic jacks at the anchorages. By June 16 the cables were banded and suspenders had been set from which to hang the steelwork of the roadway. The last steel member was set in place on July 14. Main span concrete was started on July 28 and all roadway concrete was completed on July 31.

The bridge was completed and opened to traffic in August. Total cost was in the neighborhood of \$1,500,000.

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LANDING SHIPS FOR TANKS

(Continued from page 68)

tric-powered cranes on 54-ft. high portal gantries comprise the weight-handling facilities in the yard. They have a weight-handling capacity of 15 tons at 60-ft. radius. They are the self-propelled type, traveling the full width of the assembly area and between the berths. They have 25-ft. wheel bases and operate on rails 20 ft., c. to c. Biggest section to go into the ship is the 57-ton stern, which is picked up by two of the 30-ton cranes. Next largest is the 27-ton upper portion of the bow. For other than the bow or stern the heaviest section is 15.5 tons.

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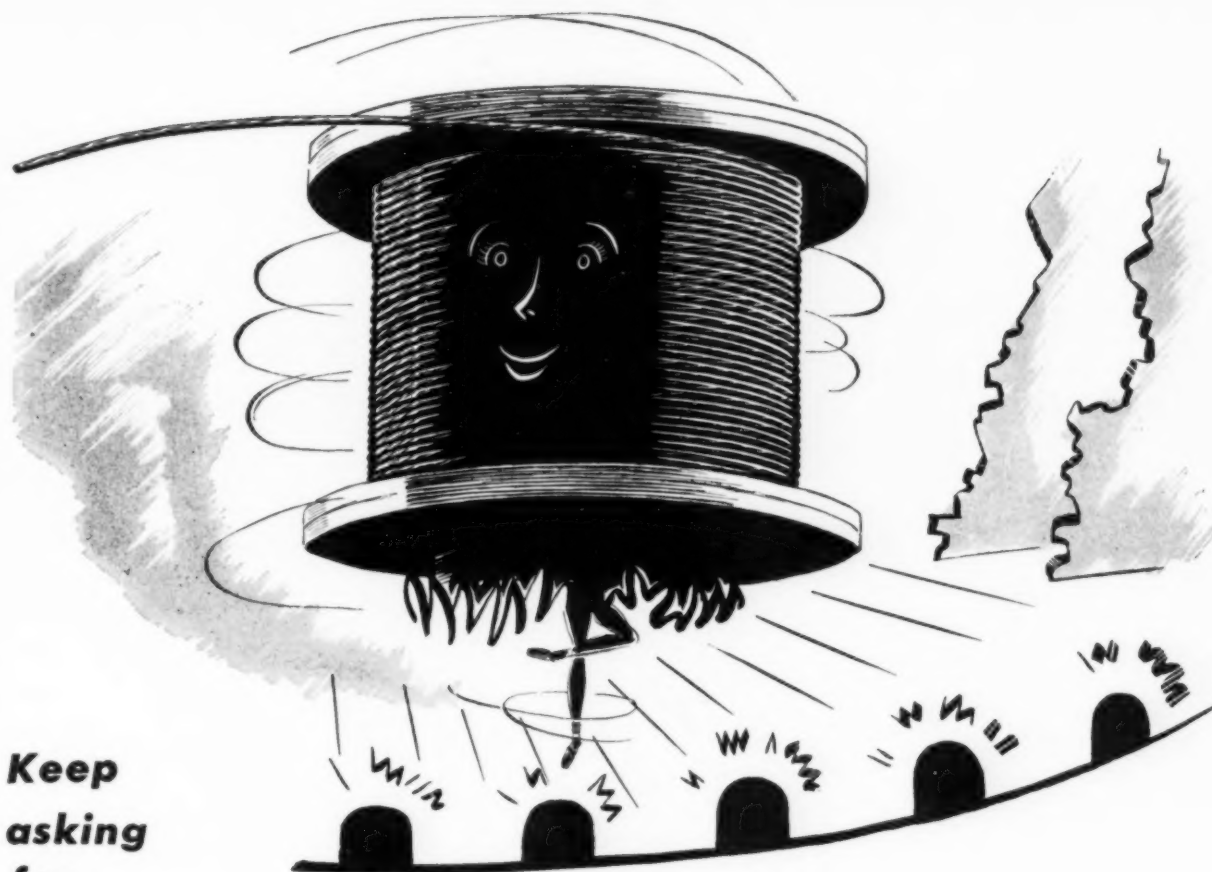
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